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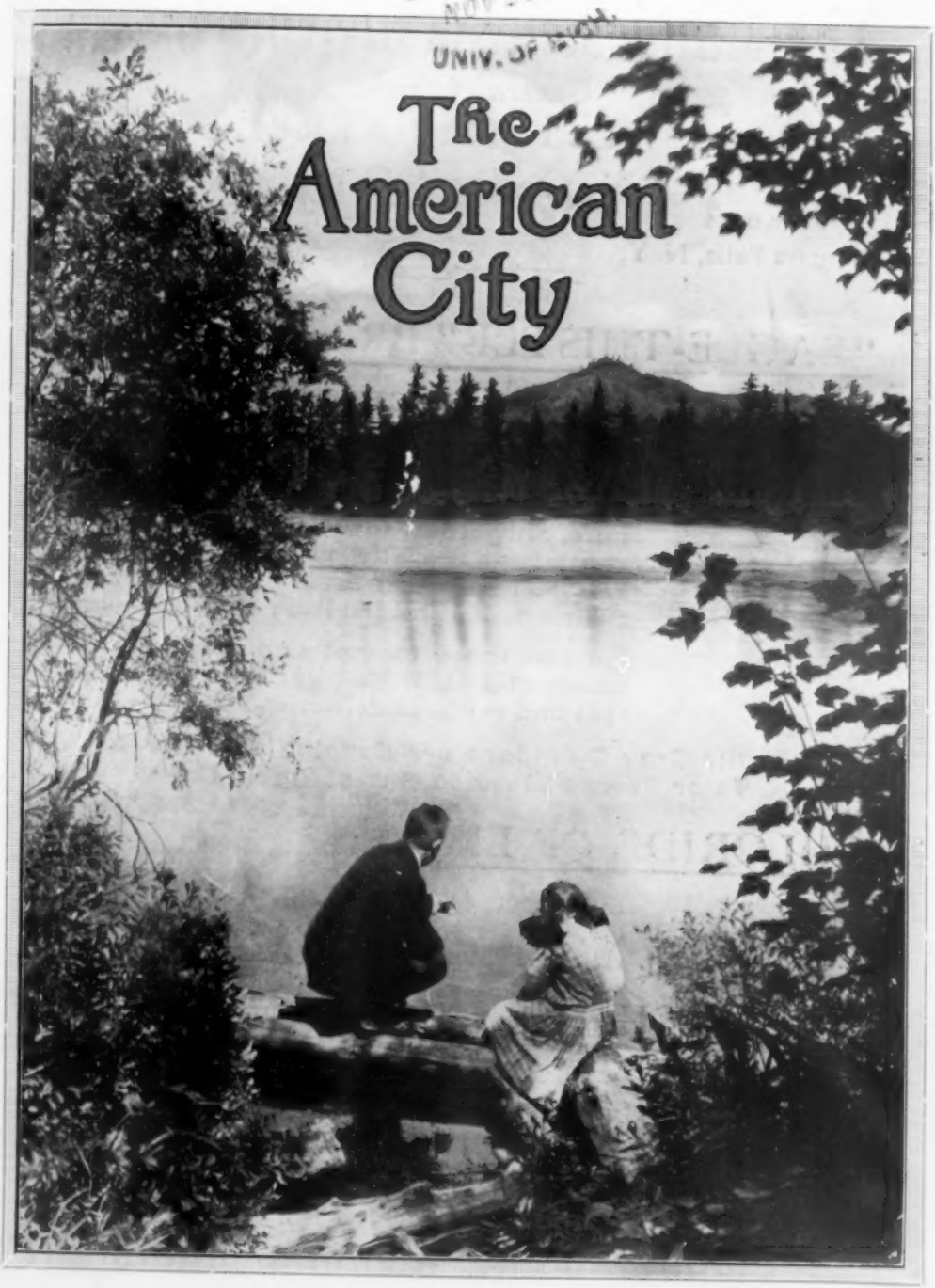

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The Water-Supplies of the Panama Canal

By George C. Bunker
Sanitary Engineer, Balboa Heights, C. Z.

THE importance of the water-supplies of the Canal Zone cannot be judged by the size and output of their purification plants. A true international aspect is given to the purification of these supplies because the Panama Canal furnishes water to vessels of various nationalities which sail on the Atlantic and Pacific oceans, to the cosmopolitan passenger movement to and fro across the Isthmus to the residents of the cities of Colon and Panama in the Republic of Panama, and to its employes.

Three purification plants are in service for supplying filtered and disinfected water for domestic and industrial consumption: first, to the cities of Panama and Colon in the Republic of Panama; second, to the communities of employes of the Panama Canal at Cristobal, Mt. Hope, Gatun, Paraiso, Pedro Miguel, Balboa, Balboa Heights and Ancon; and, third, to the military and naval forces at the various posts in the Canal Zone. This represents a total combined population of approximately 110,000, of which 108,550, or 98.4 per cent, are provided with filtered and disinfected water. Part of the 1,700 people of which the above 1.6 per cent is composed are provided with condensed or distilled water, so that it may be assumed that approximately 1,200 per-

AERATION BASIN AT MIRAFLORES FILTER PLANT, CANAL ZONE
Head house, settling basin and filter house are seen at center and left. Miraflores Locks and emergency dams are shown at right

sons drink unfiltered water from various sources.

The Miraflores Plant

The Miraflores purification plant, located opposite the Miraflores Locks, on the east side of the Canal, was placed in operation in March, 1915, and supplies filtered and disinfected water to Paraiso, Pedro Miguel, Corozal, Balboa, Balboa Heights and Ancon in the Canal Zone, and the city of Panama. The raw water is pumped to the plant from an intake in the Chagres River, close to the bridge which crosses the river at Gamboa, through 11.3 miles of 30- and 36-inch cast iron pipe. This river is 65 miles long and has a drainage basin of 559 square miles. The pumps lift the water from lake level, varying from 80 to 87 feet above sea level, to the top of the Continental Divide at elevation 271, from which point it flows by gravity to the plant.

The capacity of the plant is 17,000,000 gallons per day, and the average daily outflow during the fiscal year of 1919 was 9,371,000 gallons. The filtered and disinfected water flows by gravity to a pump station at Balboa, from which it is pumped to a low-service reservoir holding 1,000,000 gallons, and a high-service reservoir, holding 2,500,000 gallons, both of which are used as surge tanks.

The plant consists of the following units: an aeration basin, 86 by 130 feet in plan, equipped with 105 spraying nozzles; a head house containing three baffled mixing chambers of the under- and over-flow type, alum storage space, solution tanks, and a bacteriological laboratory; three cross-connected, parallel, concrete sedimentation basins, with a total capacity of 4,500,000 gallons, measuring 300 by 125 feet in plan by 17 feet deep, each of which contains two solid baffle walls in which there are five rectangular openings near the top; a filter box into which the settled water flows; a filter building containing 14 rapid sand filters of the gravity type, with a combined filtering area of 5,950 square feet, and an office and laboratory; a 900,000-gallon clear-water well under this building; a 300,000-gallon concrete wash-water tank from which the plant Pedro Miguel and Paraiso are supplied; a small concrete building for housing duplicate chlorinators; and a pump station in which there are pumps for filling the wash-water tank and an air compressor for air washing the filters.

In place of the usual ridge block and pipe systems of underdrainage there is a reinforced concrete false bottom, 12 inches thick, which forms the top of a pressure chamber 2 feet deep. In the false bottom there are placed 1,677 vertical ⅜-inch brass feed pipes, spaced 6 inches center to center. The ends of the pipes projecting above the false bottom are bent 180 degrees, so that the wash water instead of discharging upward is deflected upon the floor or gravel. These are the first filters constructed with reinforced concrete false bottoms, and the first five years of operation have demonstrated that this type of underdraining system effectively washes the sand and gravel at a low cost of maintenance. During the first fiscal year of 1919 the filter runs averaged 32 hours and the wash water 2.85 per cent.

The Mt. Hope Plant

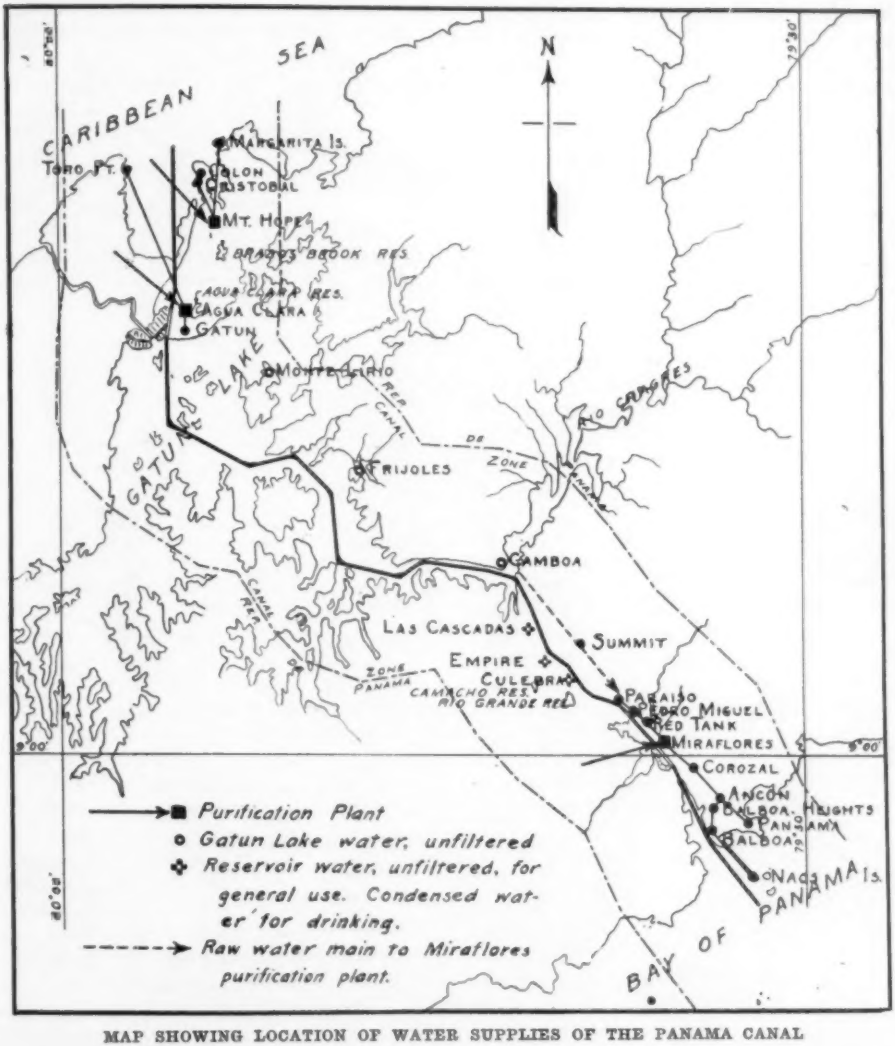
The Mt. Hope plant, located at Mt. Hope on the road to Gatun, was placed in service in February, 1914, and supplies filtered and disinfected water to Colon, Cristobal, Margarita Point and Mt. Hope. The raw-water supply flows by gravity from Brazos Brook Reservoir, with a storage capacity of 650,000,000 gallons, located 1¼ miles southeast of the plant.

The capacity of this plant is 8,000,000 gallons per day, and the average daily outflow during the fiscal year of 1919 was 4,515,000 gallons, which increased to 6,091,000 gallons during the last ten months of the last fiscal year. Adjacent to the plant there is a pump station from which the filtered and disinfected water is pumped directly into the distribution system of the district supplied by this plant.

The Agua Clara Plant

The Agua Clara plant, located 1.8 miles northeast of the Panama Railroad Station at Gatun, but close to the main highway between Colon and Gatun, was placed in service in December, 1911. It supplies filtered and disinfected water to the Gatun District and Toro Point. The raw-water supply flows by gravity from an impounded reservoir, 470 feet east of the plant, which has a maximum storage capacity of 612,000,000 gallons and a watershed area of 1,019 acres.

The capacity of this plant is 2,500,000 gallons per day, and the average daily out-



MAP SHOWING LOCATION OF WATER SUPPLIES OF THE PANAMA CANAL

flow during the fiscal year of 1919 was 1,164,000 gallons. Adjacent to the plant there is a pump station from which the filtered and disinfected water is pumped directly into the distribution system and a 340,000-gallon concrete reservoir.

The general design of the Mt. Hope plant is similar to the one at Miraflores. The Agua Clara plant was built without any provision for aeration, but on the recommendation of the writer a wooden box aerator, 4 by 8 feet in plan by 4 feet deep, patterned after those in use at South Norwalk, Conn., the bottom of which is perforated with ¼-inch holes spaced on 1-inch centers, was placed in service in August, 1916. Practically four years of service have been obtained from this box, which makes the cost of aerating an average of 1,000,000 gallons of water per day very low. In other respects this plant is similar to the other two plants, with the exception that it is neither so well arranged nor equipped.

Aeration

Aeration is a very essential feature of

water purification in tropical countries, not only for taking care of odors produced by algae but for removing those of fermentation and putrefaction. It has been found at the Mt. Hope and Agua Clara plants that a marked increase in the length of the filter runs and a decrease in the amount of wash water have been effected by introducing the alum prior to aeration, which will remove about 75 per cent of the carbon dioxide liberated by the reaction of this chemical with the alkalinity of the water. There is a direct relation between the length of filter runs and the amount of carbon dioxide in the settled water applied to the filters, other conditions being the same.

Contrary to the writer's expectations when he first entered the tropics, comparatively little trouble has been experienced with disagreeable tastes and odors in the supplies of the three plants due to algae. At times when odors of any noticeable intensity developed, the aeration successfully removed them, and it has never been necessary to apply copper sulphate to the Brazos Brook and Agua Clara reservoirs to eliminate odor- and taste-producing organisms. In the case of the Camacho reservoir, the copper sulphate treatment has been used several times to remove excessive growths of anabaena and chlamydomonas, because this supply of water is not filtered prior to its entrance into the distribution system.

Effects of Microscopic Organizms

The miscroscopic organisms have a marked influence on the length of the filter runs. This has been noticed especially at the Miraflores plant. The longest runs, of 141 hours, are obtained in the flood periods of the Chagres River during the rainy seasons. As the turbidity of the raw water decreases after the floods, the microscopic organisms start to increase again in numbers and the filter runs start to shorten. The shortest runs, 15 hours, occur during the dry season. At this plant it has been found that an increase in the amount of alum will effect a partial removal of the organisms in the settling basins and increase the length of the filter runs.

The copper sulphate treatment has been used successfully at Brazos Brook and Agua Clara reservoirs to reduce the numbers of certain organisms which were influencing the length of the filter runs, but the writer is of the opinion that no great saving is effected through the treatment when its cost is balanced against the amount of wash water saved. During 1915, when pressure filters were in use in a small plant in Ancon, the water-supply being derived from Miraflores Lake, extremely sudden and large growths of diatoms would develop, with the result that in a few hours the filters would be plugged tight and large quantities of wash water would have to be used until the effects of the copper sulphate treatment would relieve the situation for a few days.

Chemical Characteristics of Waters

The following table shows some of the chemical characteristics of the raw-water supplies of the three plants during the fiscal year ended June 30, 1919:

	Parts Per Million		
	Mt. Hope	Agua Clara	Miraflores
Color	18.00	23.00	11.00
Turbidity	13.00	8.00	4.00
Alkalinity	39.00	17.00	53.00
Hardness, soap	40.00	15.8	47.00
Oxygen consumed	2.6	2.9	1.00
Chlorine	6.00	6.8	6.6
Iron	0.23	0.47	0.25
Solids, total	79.00	62.00	112.00

The color, turbidity and iron are easily removed from the raw-water supplies of the Mt. Hope and Miraflores plants by moderate amounts of alum—182 and 132 pounds per million gallons, respectively. There has been considerable variation in the chemical characteristics of the raw-water supply of the Agua Clara plant during the last five years, which renders the treatment of this water more difficult and expensive. For example, the solids have varied from 53 to 86 parts, the alkalinity from 13 to 21 parts, the soap hardness from 6.3 to 26 parts, the iron content from 0.30 to 3.00 parts, the color from 10 to 152 parts, the turbidity from 6 to 46 parts, and the oxygen consumed from 1.55 to 9.8 parts.

In his report for the fiscal year ended June 30, 1916, the writer stated that:

"The continual low alkalinity of the raw-water supply of this plant, 14 to 20 parts per million, with the amount of alum necessary for the removal of the color, which has varied from 30 to 110 parts during the fiscal year, have produced conditions such that it was considered advisable and necessary to increase the alkalinity and decrease the amount of free carbonic acid in the fitered water by the addition of soda ash or lime. The application of the former was started in the early part of February. The use of settled water with zero

alkalinity and, at times, an alum acidity, caused a shortening of the filter runs to about four hours, a cementing together of the sand, with the formation of hard spots in the filters, a marked corrosive action on service pipes, and —most important of all—a harmful physiological effect."

After numerous laboratory experiments, it was decided to introduce lime into the partially decolorized and clarified raw water as it passed from one compartment of the settling basin to the other. This method of treatment, with the addition of the alum to the raw water just before the latter entered the box aerator, was continued until April, 1920. During this period the alum varied from 110 to 409 pounds, and the lime from 26 to 329 pounds per million gallons.

In April of this year, on account of the increase in color in the raw water to 132 parts and in iron to 2.45 parts per million and the accompanying increase in alum, it became necessary to supply artificial alkalinity to the raw water prior to the addition of the alum in order to obtain the proper "floc" and color removal. Because of the difficulties of handling and applying the lime solution in the quantities necessary with the facilities at hand and the small difference in cost between lime and soda ash, it was decided to use the latter, introducing it about 200 feet ahead of the alum. The addition of the lime to the settled water is continued, however, in order to absorb the free carbonic acid, increase the alkalinity of the filtered water and lengthen the filter runs.

At the present time, with a color of 152 parts, an iron content of 2.2 parts, a turbidity of 28 parts, and an alkalinity of 24 parts per million in the reservoir water, it is necessary to use 544 pounds of alum, 75 pounds of soda ash and 81 pounds of lime per million gallons of water to obtain a filtered water with 5 parts of color, 0.1 part of iron, 29 parts of alkalinity, and no turbidity.

Chlorination

At each of the three plants there is a chlorinator for disinfecting the filtered water. During the month of April, 1920, chlorine was applied to the plants at Miraflores, Mt. Hope and Agua Clara at the respective rates of 3.1, 3.0 and 2.4 pounds per million gallons. The disinfected water from each of the purification plants conform to the bacteriological standards of the U. S. Treasury Department. The monthly reports of the daily examinations of water samples as made up by the writer are submitted each month to the Chief Health Officer of the Panama Canal for examination and approval.

A resident superintendent, a graduate from either a sanitary engineering or sanitary chemistry course, operates each plant and makes daily routine chemical and bacteriological examinations of the water passing through the plant and the distribution system. At the Miraflores plant there are well-equipped testing laboratories for the examination of road materials, general analytical work, and research work in connection with the purification of water.

Impounding Reservoirs

There are four impounding reservoirs in the Canal Zone which are used in water-supplies. Two have been mentioned, Agua Clara and Brazos Brook, while the other two, known as Camacho and Rio Grande, with respective storage capacities of 283,510,000 and 400,000,000 gallons, are the sources of the water-supply for communities on the west side of the Canal, Culebra, Empire and Las Cascadas. The waters from these reservoirs are not filtered, but since the days of construction condensed water has been furnished to the people residing on this side of the Canal for drinking purposes.

The watersheds of the reservoirs are uninhabited and are policed to prevent trespassing. The maintenance gangs are provided with sanitary buckets, which are emptied, at the end of each day's work, into pits or buried outside the limits of the watershed. While free from pollution of human origin, the reservoirs are subject to pollution from the large numbers of wild animals in the jungle growth. Without going into this matter in detail, it is sufficient to state that the sum total of the pollution thus introduced directly and indirectly into the waters of the reservoirs is of considerable magnitude.

Stagnation and putrefaction of the volumes of water in the reservoirs below average depths of 13 feet have been responsible for more complaints from consumers and the distribution of water of poor quality, from the standpoint of appearance and

chemical composition, than any other factors in the water-supply system of the Panama Canal. Stagnant layers of the water with high color and iron contents and disagreeable odors are frequently found 10 feet below the surface of some of the reservoirs, and at times even closer. In the writer's opinion it is absolutely necessary in the tropics to install an adjustable intake in place of a series of fixed intakes so that water may be drawn from any desired elevation.

All reservoirs in the tropics should be provided with blow-off valves in order to waste the bottom stagnant layers of water after heavy rains rather than to allow the fresh run-off to waste over the spillway. The present poor quality of water in Agua Clara reservoir is due to the non-removal of the stagnant bottom water during the last rainy season on account of the liability of injuring construction work.

A caretaker at each reservoir directs the work of a maintenance gang, which cuts the grass around the shore line, cleans the beds of the feeders, clears off the brush and trees growing along the feeders and the shore line of the reservoir proper, and takes care of the miscellaneous work which arises from time to time. Daily records of the rainfall and elevation of water are kept.

Cost of Water Purification

The costs of furnishing filtered and disinfected water during the fiscal year ending June 30, 1919, were as follows:

COST OF WATER PER 1,000 GALLONS

	Gatun System	Colon-Cristobal System	Pedro Miguel-Ancon-Balboa System
Operation of raw water pump station			$0.0155
Operation of filtered water pump station	$0.0419	$0.0184	0.0137
Operation of purification plant	0.0240	0.0135	0.0198
Maintenance of reservoir	0.0304	0.0133	
Maintenance of mains	0.0155	0.0312	0.0276
Total	0.0118	0.0764	0.0766

Water is sold to vessels at the docks at Balboa and Cristobal at 50 cents per 1,000 gallons, with a minimum charge of $3. In the cities of Colon and Panama water is sold only through meters, of which there are about 971 in the former and 2,431 in the latter city.

The following table contains certain statistics regarding the consumption and cost of water in the cities of Colon and Panama:

	Colon	Panama
Population	26,078	61,369
Average daily consumption, gals.	1,367,800	2,541,000
Average daily consumption per capita, gallons	52	41
Average quarterly consumption for private connection, gallons.	60,250	67,536
Number of private connections or meters	971	2,431
Average private quarterly bill	$27.98	$15.52
Rate per 1,000 gallons	0.45	0.30
Discount on quarterly bills within 16 days, per 1,000 gallons	0.05	0.05

The Municipal Engineering Division, under the direction of D. E. Wright, Municipal Engineer, operates the water-works and receives credit for the cost value of water furnished other departments and divisions of the Panama Canal, the Panama Railroad, the Panamanian Government, other departments of the U. S. Government, and individuals and companies.

Has Your City Seen These Exhibits?

The American Federation of Arts has constantly on tour some forty traveling exhibitions of many kinds, paintings, sculpture, engravings, industrial arts, photographs, textiles, wall paper, prints for home decoration, etc., etc., selected by experts. These reach all parts of the country, having made 150 stops this year. It also circulates illustrated lectures, prepared by authoritative writers, museum curators, painters, sculptors and other qualified persons.

The Federation works for better art education, uniform art legislation, establishment of competent art commissions; it supplies art information and study courses. It has thrown its weight in favor of the rapidly growing movement toward industrial arts design worthy of the stamp "Made in the U. S. A."

RICHARD F. BACH, Extension Secretary,
The American Federation of Arts,
The Metropolitan Museum of Art, New York City.

Genuine Savings Through Municipal Ownership

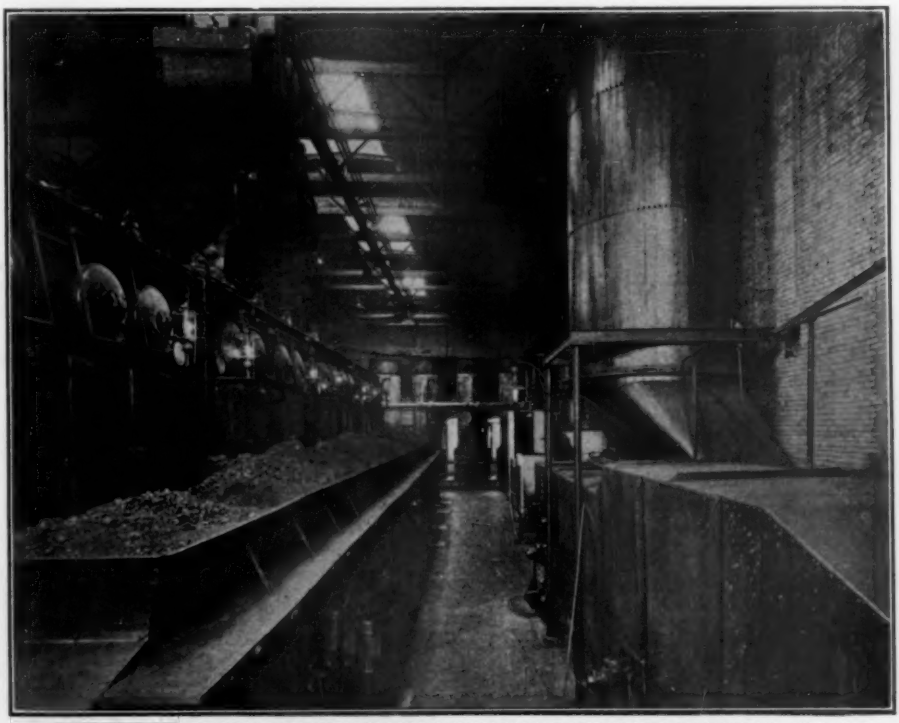
The Story of the Holyoke, Mass., Municipal Plants

By John J. Kirkpatrick
Municipal Manager, Gas and Electric Department

THE city of Holyoke, Mass., has been successfully operating its gas and electric plants for more than seventeen years, having taken over the plants of the Holyoke Water Power Company in 1902. All of the machinery that was in the electric plant when it was taken by the city has since been discarded, except the water wheels, and none of the old gas plant is now in use except the gas holders, the pipe shop and the office building.

The two plants cost the city $815,000 in 1902. Now they have a book value of nearly $2,000,000, although the bonds still outstanding exceed the amount originally issued by only about $160,000. In 1903 the output of the electric station was about 1,300,000 k.w.; in 1919 the output was nearly 20,000,000 k.w. The amount of gas manufactured in 1903 was 99,600,000 cubic feet; this figure had increased to 276,862,000 in 1919.

The gas works is equipped with two water gas sets having a capacity of 1,200,000 cubic feet per day. The coal gas plant employs the Woodhall-Duckham system of vertical retorts. From the coal gas, residuals of coke tar and ammonia are obtained and from the water gas one residual, water gas tar, is derived. These residual by-products net the city an appreciable sum each year, amounting in 1919 to $24,431.23.



A BATTERY OF BOILERS IN THE POWER PLANT OF THE HOLYOKE MUNICIPAL GAS AND ELECTRIC PLANT

a sum exceeding, for example, the amount spent under the heading of "general salaries."

At the electric station the steam generating equipment consists of one 4,000-k.w. Westinghouse turbine, two 2,500-k.w. and one 1,250-k.w. General Electric turbines. Steam is provided by eight Babcock & Wilcox boilers, with superheaters of 400 h.p. each.

There is a small hydro-electric plant operated in connection with the electric station, water for which is drawn from the first level canal (owned by the Holyoke Water Power Company and discharged through four 250-h.p. wheels into the second level canal. The water power is what is known locally as non-permanent power, generally termed surplus power. Under the terms of the lease with the Power Company, the city has the right to draw 16 non-permanent mill powers of water from the canal and pay to the company a rental of $5 per day per mill-power when the water is available. A mill-power in Holyoke is the right to draw 38 cubic feet of water per second under 20 feet head. The water is available on an average of about nine months of the year, and is very unreliable during six of the nine months. Many times the water is available for only part of the day. On short notice the station is deprived of its use, sometimes for days, and even months. Because of its unreliability, it is considered of little if any value to the plant. About 22 per cent of the energy generated during the last seventeen years was from water power; the balance, about 78 per cent, was generated by the steam turbine.

A remarkable feature of the operation of the plant is reflected in the cost of street lighting for the period covered by municipal operation. Under Massachusetts laws, municipal plants are required to sell both gas and electricity at cost to the municipality owning the plants. Consequently, the city of Holyoke paid less for street lighting in 1919 under municipal ownership than it paid in 1902 under private ownership, notwithstanding the fact that there were four times as many street lights in 1919 as in 1902. In discussing the relative advantages of municipal and private operation of utility plants, the fact that a municipally owned utility pays no taxes is often advanced as an argument against municipal ownership. This argument is answered in Holyoke. It is generally conceded that the prices paid for street lights in Holyoke are among the lowest, if not the lowest, in Massachusetts. If the city of Hoyoke had paid to the Gas and Electric Department during the past sixteen years the lowest prices that any city or town in the state paid for metered electricity in buildings and for street lights, then the city would have paid $453,745 more than it actually did pay for such purposes. If the Department had paid taxes during these years it would have paid $358,134. The difference between these amounts is $95,611 and it represents the loss to the Department because it was not permitted to pay taxes and to charge the city at the going rate for the gas and electricity it uses. Therefore, the Department figures that it has not only paid the equivalent of taxes, but nearly $100,000 more than its share of the taxes.

These figures demonstrate that the plant saves money for the municipality. It also saves money for the individual citizens. The following tables show the relative costs of gas and electricity in typical Massachusetts cities.

CHARGES FOR GAS

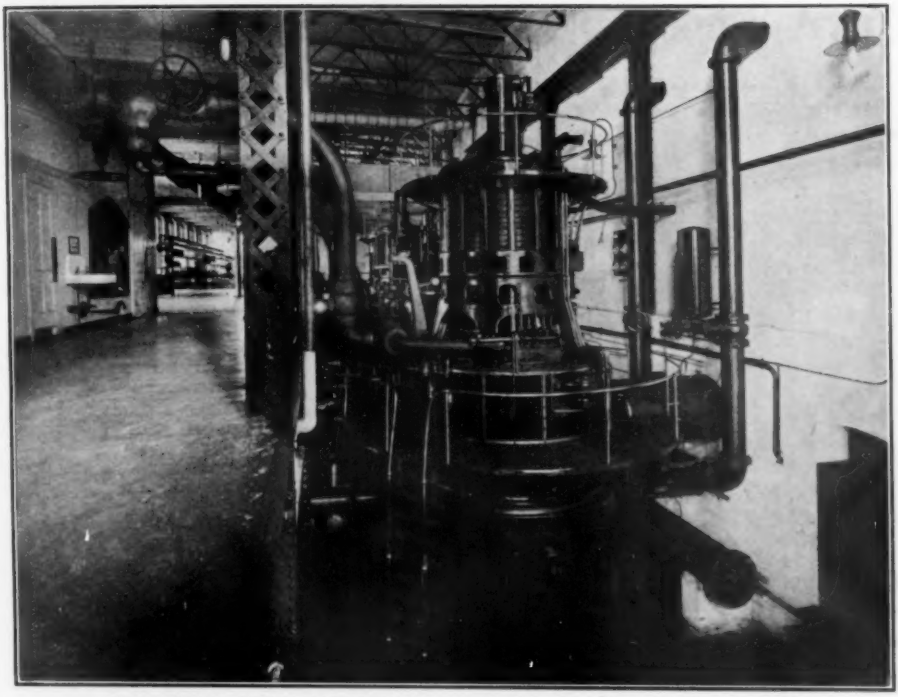
	Per Thousand Cubic Feet
Springfield	$1.45
Worcester	1.50
Cambridge	1.60
Boston	1.60
Pittsfield	1.80
Westfield (municipal)	1.80
Northampton	1.80

Holyoke has charged $1.20 up to July 1, 1920, on which date it was found necessary to raise the rate to $1.60 with a minimum charge of 50 cents per month. The figures for electricity are even more favorable:

	Per K.W.H.
Chicopee	$.09
Westfield	.09
Springfield	.10
Worcester	.09
Boston	.10

The rate in Holyoke has been $.06 per k.w.h. since the year 1906, with minimum charge of 50 cents per month.

The Annual Report of the Gas and Electric Department is profitable and interesting reading for the citizens of Holyoke, who follow the activities of their city government. The Holyoke report differs from the reports issued by many other cities, in that one does not have to be a certified public accountant in order to understand it. The statements of costs and profits are simply



GENERATOR SETS OF THE MUNICIPAL ELECTRIC PLANT, HOLYOKE, MASS.

and clearly made, sufficiently itemized to be satisfactory, but without such a mass of detail as to be confusing. It is an account rendered to the citizens of the municipality, prepared in such a way that its contents can be readily grasped by everyone. When the taxpayer reads the annual report for 1919, with the tables showing the mounting costs for a period of half a dozen preceding years, he needs little other argument to reconcile him to the increased gas rate or the minimum charge on both gas and electricity. When he looks over the table showing the savings value of the commercial by-products extracted in the manufacture of gas, he feels reassured that the plant is run under the same principles of economy with which he manages his own business enterprises or conducts his household. He has confidence in the Department, because he has been allowed to understand its workings.

With the expansion of Holyoke, both the gas works and the electric station have nearly reached the ultimate capacity of the sites upon which they are located. The city has already taken measures to secure larger sites, upon which will be erected a new electric station and an extension to the gas works.

A Commendable Private Gift for Public Service

In appreciation of the excellent work of the local fire department of Madison, N. J., which saved a number of buildings on Geralda Farm when fire destroyed a barn and threatened the other structures, Mrs. Marcellus Hartley Dodge has presented the borough with a new motor-driven fire engine. The contract for the purchase was signed less than ten days after the fire, and full power of selection was given to Fire Chief B. C. Philhower, who carefully studied a number of different types of engines. The new motor equipment of the latest type will have a capacity of 1,200 gallons a minute and is much larger than the motor engine now in use, which the department has had since 1911.

Appraising Public Utility Properties

Final Determination of Value for Rate-Fixing is a Governmental Rather Than An Engineering Function

By Delos F. Wilcox

NEW JERSEY is a state of original ideas; at least it has recently given birth to a new thought in valuation procedure. By chapter 351 of the laws of 1920, the so-called Allen Act for the valuation of street railways, the Legislature has by-passed the State Utilities Board entirely, and has adopted a simple, short-cut method for the performance by contract of what has hitherto been regarded as one of the most difficult and inescapable functions of government. The success of this experiment would usher in a millennium for all the parties, or possibly for all but one of them. The commissions would be spared the intolerable toil of thought. The engineers would see their calling and election sure. The companies would be relieved of their constant dread that the regulatory body may unhappily develop too great an interest in the ratepayers' point of view. The public—well, the public is supposed to be generous and to be able to satisfy itself by contemplation of the benefits that accrue to the other parties.

The Allen Act in effect removes the whole problem of street railway valuations from the jurisdiction of the Utilities Board. It provides that three state officers, the governor, the state treasurer and the state comptroller shall act as a commission to procure a valuation of the property of any or all street railway and traction companies in the state, and appropriates a fund of $100,000 for the project.

The new Commission is "authorized and directed to immediately select, by a majority of all of its members, a competent electrical or mechanical engineering concern, either firm or corporate, of the highest established reputation, equipped and organized for and experienced in the work of valuing street railway property." The Commission is further authorized and directed to enter into a contract with the engineering concern so selected to make and complete as soon as possible a valuation of all the property of any street railway or traction company which the Commission may designate. The act provides that the engineering concern selected by the Commission is to proceed immediately with its work and is to have access to the property and records of the company concerned, and also to have the use of all documents, records and testimony in the possession or custody of any commission, board or department of the state or of any political subdivision of the state. The Valuation Commission is authorized to agree with the engineering concern upon the amount of compensation to be paid for its services and expenses and also to decide upon the time to be allowed for the valuation of the property.

Section 9 of the act is the one that represents New Jersey's new idea born out of political wedlock. It is a prodigy.

> "When the valuation of the property of any street railway or traction company is completed as herein directed, the engineering concern so selected to make such valuation shall file with the Commission herein constituted a complete and detailed report of such valuation in form available for use for the purpose of fixing rates under existing laws, which report, together with all documents and maps, and other papers accompanying same shall be immediately transmitted to and filed with the Board of Public Utility Commissioners of this state, and shall be a public record, open to the inspection of the public at all reasonable times, *and shall be admitted as evidence in the courts of this state and shall be evidence of the facts therein contained to the same extent as though the same had been produced and proved and the value of the property as set forth in said report shall be accepted by the Board of Public Utility Commissioners of this state as the value of said property as of the date specified in said report in any rate proceeding under any law of this state to the extent that the value of said property is a factor in the fixing of a rate.*"

This law, if it be a law, is based upon the fallacious assumption that the fair value of a public utility property for rate purposes is a *fact* which can be ascertained by any firm of experienced and competent engineers, whereas the truth is that the determination of the value of such a property is

not an engineering but a governmental function, and depends upon the weighing of a great number of different facts by a body clothed with governmental power and governmental responsibility. In the Public Service Railway rate proceeding which was referred to, the municipalities analyzed the Cooley valuation and after making certain adjustments and corrections of method, contended that the fair present value of the property for rate purposes was less than $60,000,000, while a Stone & Webster man, produced on behalf of the company, figured out a value of $180,000,000, and another engineer, formerly with H. M. Byllesby & Company, stopped at $165,000,000.

This wide range in the estimates of value presented by various witnesses before the Utilities Board is accounted for, primarily, by differences in their theories of valuation. It is one of the fundamental functions of courts and public service commissions, before which testimony in rate cases is taken, to weigh all of the evidence; take into consideration all of the pertinent and proven facts; decide what are the correct and legal rules in the application of the several methods of appraisal, and finally determine, on the basis of all these factors, what, in their judgment, is the fair present value for rate purposes of the property devoted to the public service in the case before them. The legal basis of valuation for rate purposes was originally set forth by Mr. Justice Harlan, speaking for the United States Supreme Court, in the case of Smyth v. Ames twenty years ago, in the following words:

"We hold, however, that the basis of all calculations as to the reasonableness of rates to be charged by a corporation maintaining a highway under legislative sanction must be the fair value of the property being used by it for the convenience of the public. And in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth."

Is it not clear that the determination of the fair value for rate purposes of the property of a public utility is a governmental function of the highest type? It would be no more radical a departure from established governmental procedure if Congress, wearying of the delay on the part of the Interstate Commerce Commission in completing the valuation of the railroads of the United States undertaken some years ago, should pass an act naming an executive commission of three men and direct them to enter into a contract with some engineering firm to make a valuation of the railroads of the United States, with the provision that when the valuation was completed and nicely bound up in a volume, it should be delivered to the executive commission and by that commission transmitted, without examination to the Interstate Commerce Commission, and thereafter should be accepted by the Interstate Commerce Commission as the basis for rate-fixing, and, without proof, should be evidence in all the courts of the United States of the facts which it purported to find. Under the New Jersey act, the determination of value will be the determination of an engineering concern hired to perform a public function without supervision, without responsibility, without public hearings, and even without testimony or an opportunity for the cross-examination of witnesses.

Forsooth, we are entering upon a new era of simplicity in valuation work and the regulation of public utility rates. The New Jersey Legislature has found a way to cut the Gordian knot. The only trouble with it is that if, by any chance, the engineering concern selected to make the valuation should be persona non grata to the Public Service Railway Company, or if, after the work is completed and the state's money spent, the result should be displeasing to the company, then the valuation by the engineering concern will not be worth the paper it is written on, for a public utility company could surely protect itself against the invasion of its rights by a procedure so obviously at variance with "due process of law." Whether the public has any protection against adverse results under this fantastic measure remains to be seen.

Can Fire Department Trucks Be Utilized for Snow Removal?

By Harry R. Hayes
Consulting Engineer, Utica, N. Y.

A MUNICIPAL problem which yearly attracts more official and public notice is that of snow removal. A few years ago this subject was given serious consideration by only the larger cities, where unusual congestion of traffic caused very disastrous results. It is not many years ago that snow conditions were met in only one way, and that by operating equipment designed for winter use, and the question of the removal of the snow itself was considered a work of an extravagant nature. In those days even the fire apparatus was equipped with sleigh runners for winter use, and it was only the railway companies in the average-sized cities which directed any activity towards the work of snow removal.

In later years, however, large investments have been made in motor equipment, municipalities have discarded horse-drawn apparatus and have adopted motor equipment for fire purposes, and, in fact, ordinary business concerns have installed motor equipment for almost every delivery purpose, so that to-day any slight street congestion caused by snow conditions not only retards transportation in the commercial and manufacturing field but also seriously affects the prompt and efficient operation of motorized fire equipment and disrupts the important work of garbage and refuse collection and removal. There is also a marked increase in the winter use of automobiles for business and pleasure. There is need for extended snow removal work in order to afford parking space for passenger vehicles. The business men in the store districts show a strong desire to have the streets kept cleared of snow during the winter for business reasons. They realize the necessity more each year for clean and uncongested streets both in summer and in winter. It is also generally recognized that the more work that is directed on snow removal the less ice there will be to remove, and the less amount of street cleaning there will be to do in the early spring.

Conceding, therefore, the importance of snow removal and winter street cleaning work, a municipality should adopt a systematic means of its accomplishment. The aim of a municipality should be, first, to open and maintain open for vehicular traffic the main arteries; second, to clear the snow from the congested districts as rapidly as possible; third, to remove the snow from the side streets after the main streets are cleared; and, fourth, to keep the streets in the business section as clean as possible. These four aims can be realized by properly planning the work sufficiently far ahead for easy execution.

During a winter of very mild weather snow removal and street cleaning is comparatively a simple problem. It is important, however, that the city should be as prepared as possible to meet any emergency. In ordinary cities the two departments which are expected to shoulder the responsibility of this work are the Public Works and the Public Safety departments. These two departments should be organized so that mobilization could be effected as early as may be needed for snow removal work. In addition to the organization feature, there is also the important necessity of providing the proper equipment, and of utilizing it to the best advantage by the proper organization.

The labor market is a factor which must always be considered. It has been found when snow removal work has been planned to be operated only by the use of labor and teams, that in years when the labor market is scarce considerable delay is experienced in organizing the snow removal forces, and that in times of severe storms none but the strongest type of labor could work, and a very large percentage of this class would not work until the conditions had moderated. These and other facts have caused officials to devote time and study to improving upon methods of snow removal and endeavor to develop a system which would relieve congestion as readily as possible and one which would not be so very largely dependent upon labor.

How the Plan Would Work

Municipalities are largely discarding horse-drawn apparatus and investing vast sums of money in motorized fire equipment. Such apparatus is located in fire-houses in different parts of every city, and it would seem feasible to equip each piece of apparatus with an adjustable snow-plow and assign to each fire-house a certain district to operate. The most effective way to undertake snow removal work and to fight a snow storm is to commence operations before the storm has subsided, and the fire department would be the best agency to utilize for such such purposes. The fire department can be quickly assembled and could very early commence to operate. The snow-plows, being adjustable, could be attached in the fall and are so arranged that they could be used when needed. The fire-plows would be operating while the snow was falling and could easily keep the streets open.

It would be the duty of the fire department to keep the streets in each district cleared during the winter. The Department of Public Works should be assigned the actual work of removing the snow, and in case of an extended snowfall this force could be augmented by teams and men and also by utilizing the equipment and forces used in the work of ash and garbage removal. The plow work of the fire department on the wide streets would easily keep such streets clear, and therefore in the business district the snow removal forces of the Public Works Department should be first directed to the narrow streets, particularly the street car streets.

This plan provides for the simultaneous operation of two snow-fighting forces, namely, the plow force of the fire department, engaged in the early stage of the storm in keeping the wide streets open for traffic, and the removal force of the Public Works Department, to be first engaged on the actual removal work on the narrow congested main streets. After these congested streets have been relieved by the public work forces they could be directed to the streets which had been cleared by the plow forces of the fire department, in the order of their importance. The motor equipment of the Public Works Department could also be provided with plows, and in addition it might be of advantage to install one or more of the modern rotary snow-plows which have recently been designed for practical use on such work.

It is also possible that in many places sewers might be utilized for the disposal of the snow and also for the purpose of clearing up street intersections. A study of the local sewer situation would show which manholes could be used. Actual experiments have developed the conditions under which the sewers might be utilized for snow disposal, and consideration must be given to this point.

It might at first be thought that the utilization of the fire equipment for snow-removal work would interfere with its operation for fire purposes. The plow attachment would not have such an effect, as it can be raised or lowered as may be needed. I am also confident that it would be easy to arrange a plan whereby the department could be easily assembled for a fire call even when actually engaged on snow removal work. There are many ways in which the fire signals could be easily transmitted. There may be other objections which would prove the plan to be entirely impracticable, but it is offered for the discussion of a problem the solution of which must provide for the early mobilization of a properly equipped snow-fighting force and the maintenance of a properly organized snow-removal force.

Resurfacing Worn Brick Roads

In addition to sheet asphalt topping of old brick roads, another practice now in vogue, meeting with very good results, is to bring the old brick road to an even surface by patching or resetting the brick. The patching consists of thoroughly cleaning the rutted portions, giving the side of the hole or depression a paint coat of asphalt, and then filling it with stone of suitable size, which have already been covered or mixed with asphaltic material. After the rut has been properly tamped down and allowed to set, the whole surface of the street is treated with an application of asphaltic material at the rate of 4/10- to ½-gallon to the square yard, and covered with ½-inch chips to the extent of 50 to 60 pounds to the square yard. This creates a new road surface of splendid qualities, requiring a minimum of maintenance.

A City Proud of Its Water Waste

Chicago Publishes Booklet Boasting of Its High Per Capita Consumption

MUNICIPAL advertising carried out by a carefully arranged program is a wholesome method for aiding the growth of a municipality. Great care, however, should be exercised in choosing the various elements which are to be advertised. The city of Chicago has recently issued a booklet bearing on its cover the statement, "Boost Chicago. We Pump More Pure Water Than Any City on Earth and at a Lower Cost." This booklet between its covers contains many interesting data with regard to the water-supply of the city. If the statement on the cover had been chosen with greater care, this would be a valuable booklet for distribution among manufacturers and prospective residents who would consider locating in the city on account of the excellence of its water-supply. But, when the City Engineering Department has been working for years to secure a reduction in the water wasted, and the city faces the present necessity of enlarging its water-supply at a cost estimated at $60,000,000, such boasts are untimely.

In 1917, the Chicago Bureau of Public Efficiency carefully studied the waterworks situation and recommended universal metering as a means of checking the then gigantic waste of water, which has grown in the last three years.

When it is appreciated that costs of fuel, steel and the other materials used in pumping stations have vastly increased since 1917, the following paragraph from the report of the Bureau of Public Efficiency is of interest:

"Besides its ruinous effect upon service, the transportation of the large volume of water lost through waste and leakage means a serious financial loss. There is an abundance of water in the lake and, of course, the water itself is free, but the city is in the business of transporting it from the lake to the premises of consumers, and its transportation costs money. During 1916 it cost more than $1,000,000 just to pump water which is often regarded as free. It takes as much labor, coal, other supplies and equipment to pump water into the sewers or into the ground as it does to furnish it for a useful purpose.

"The financial loss results in two ways. Enormous expenditures are required for equipment which otherwise would not be needed. Moreover, more pumps and boilers must be operated and maintained. This means increasing the cost of the pumping station labor, fuel, supplies and repairs. It is now costing about $500,000 a year to pump water which is later wasted or which leaks away. In 1916, 190,000 tons of coal, valued at $450,000, were consumed in the Chicago pumping stations. One-half of this amount was used to pump water that was wasted. In view of the problems now involved in mining and transporting coal and of the resulting need for conserving its use, the necessity for preventing water waste, and hence fuel waste, is becoming more and more urgent."

On June 25, 1917, the City Council passed an ordinance providing that "meters may be installed upon service pipes found supplying leaks, waste or unauthorized extensive or unusual use of water" and providing that at the discretion of the Commissioner of Public Works "said meters may be removed * * * when cause for installation is corrected." This ordinance was designed to strike at the waste evil by the partial metering method, but to be successful, partial metering must be accompanied by persistent house-to-house inspection for the purpose of locating leaks.

Every city to-day should sell its water-supply to the consumer by meter and in this way reduce the waste which is so prevalent in many American cities. We believe there are few cities in a class with Chicago which care to boast of their gigantic per capita consumption of 240 gallons per day with a peak load running over 300 gallons per day per capita.

Filter and Chlorinate Your Water Supply

Filtration of public water supplies is necessary to produce a clear and palatable water. Chlorination is necessary to destroy the bacterial life which may have passed through the filters and which may cause disease. Many supplies that are now chlorinated should also be filtered and all filtered supplies should be chlorinated.

Plan for Corner Cut-Offs on City Streets to Secure Greater Safety

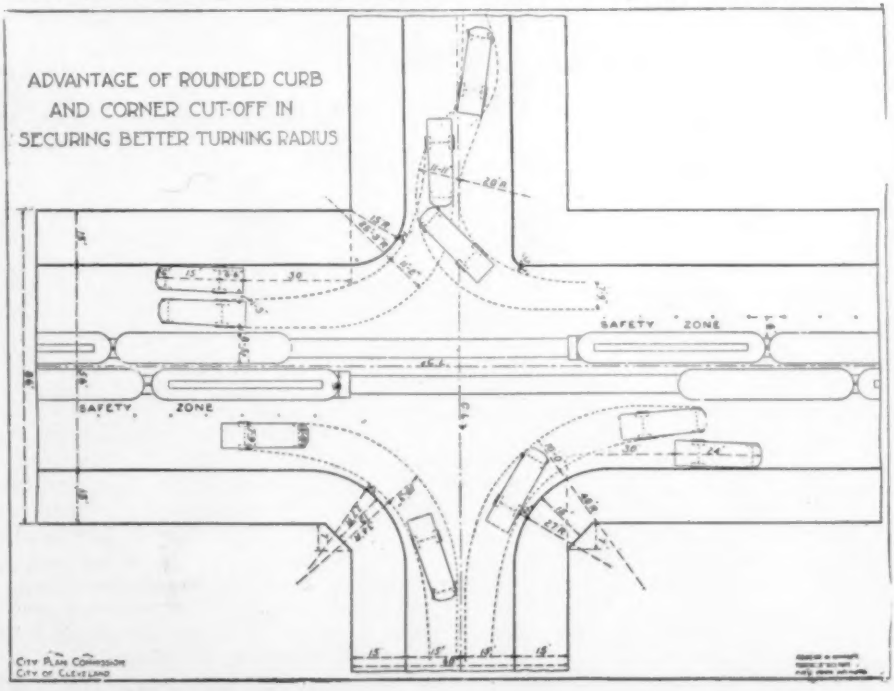
By Robert H. Whitten
Advisor, Cleveland City Plan Commission

IN laying out or widening thoroughfares provision should, as a rule, be made for street corner cut-offs so as to secure a greater turning radius for vehicles and an increased angle of vision.

The greater the turning radius at a street intersection, the smaller the danger of collision through swinging over on the left-hand side of the narrow cross-street. Even large trucks can turn on a 20-foot radius, but they seldom do so. Accidents are frequent from trucks and other vehicles swinging too far to the left in rounding corners. Without a corner cut-off the curbs could be rounded on a 15-foot radius without encroaching on the normal sidewalk space. By cutting back the corners at the street line the curbs can easily be rounded on a 27-foot radius. This gives a normal turning radius of 34 feet to 40 feet. In order, however, that advantage may be taken of the larger possible turning radius, it will be necessary to prohibit parking within 30 feet of the corner.

The wider the angle of vision at a traffic intersection, the greater the chance to stop in time to avoid collision. The wider the angle of vision, therefore, the greater the speed that can be safely maintained in approaching an intersection. This wider angle of vision can be secured either by widening the street or by cutting back the corners. Where increased street width is not needed, the cutting back of the corners is by far the more economical method of securing a wider angle of vision.

That a 5- or 10-foot cut-off does not normally decrease the rental value of a retail store, office or apartment building is shown by the number of such buildings erected without legal requirement. Such a cut-off normally furnishes the most eco-



nomical and desirable location for the entrance to a store, and a good location for display windows on both the first and second floors. Windows located on this cut-off have the advantage of looking down two streets. In addition to their business value they are, therefore, in demand for either office or apartment purposes.

ENTRANCE TO MT. GREENWOOD CEMETERY, MORGAN PARK, NEAR CHICAGO

The Planning and Maintenance of Modern Park Cemeteries

By Lucy Lowe

THE tendency in this country to-day is toward the naturalistic or parklike cemetery, as contrasted with the very formal cemetery of early days. There are many examples of such treatment throughout the country and they are increasing yearly. The ablest landscape architects are making it their business to familiarize themselves with the elements of cemetery design. No longer are the areas plotted off into so many sections, and monuments erected helter-skelter without any regard for fitness and beauty. Almost every cemetery in the country, large and small, now has rules and regulations governing the placing of markers and monuments.

The cemetery, formerly the most unattractive and depressing spot in the whole community, the most shunned section of the city, except when necessity demanded attendance there, is coming into its own as a beauty spot. The ugly, sinuous roads and drives are giving place to gracefully winding roads and paths planted with trees, and laid out in such a way as best to serve the convenience of the lot owners. The old time spotty planting is giving place to the carefully planned arrangement of planting material with an eye to enhancing the attractiveness of the grounds. We find this new note in cemetery design being taken up by cities all over the country. One of the most beautiful cemeteries in the country is the famous Mt. Greenwood Cemetery at Morgan Park, just outside of Chicago. It is a fine example of what a modern cemetery should be. Cemetery experts are learning to take advantage of site. Mount Greenwood happens to be located on land which is about the highest near Chicago and was originally covered with a dense growth of white and burr oaks, most of which have

MT. GREENWOOD CEMETERY IS ADORNED WITH FINE TREES

been retained. It has the advantage of being rolling ground, an ideal location for a park cemetery, and it is not likely that the city will encroach upon it.

One of the greatest factors in increasing the attractiveness of modern cemeteries and burial grounds has been the enforcement of rules and regulations governing the planting and the use of monuments. Most of the newer cemeteries and many of the older ones have recognized the wisdom of limiting the lot owner's choice, and in order to make a perfect whole, have kept the control of plant material in their own hands. The rules usually provide that no planting may be done without the consent of the association, and that under no circumstances may planting be removed without their permission. The same ruling applies to monuments, certain sections being sold with the understanding that no monuments are to be erected therein. Another improvement is the change in the drive system. It is customary now to make the drives no wider than necessary on the main roads, and to have a system of loops for the minor drives, whereby traffic can be carried through the cemetery without collision but without wasting space.

The up-keep of the modern cemetery is due to the perpetual care system. Perpetual care is the result of putting the cemetery on a paying basis. The modern cemetery is a business proposition. Take, for instance, Mount Greenwood Cemetery's system. This association since 1910 has been selling lots with the guarantee of perpetual care without additional charge. It has been able to do this because it is sound financially. Its funds are secured by following the plan outlined: 20 per cent of the price of all lots sold, 20 per cent of the price of all single graves sold, 20 per cent of all interment charges, and 20 per cent of all charges for monument and headstone foundations are invested with other trust funds and the interest compounded. Each year this is increasing, and very soon the fund will reach the half-million mark, thus insuring a financial backing. There is no danger of this cemetery's losing its high standing among the associations as one of the best equipped and best cared for in this country.

The associations in charge of cemeteries are rapidly coming to learn that beauty is an asset, that the cemetery which can give an assurance of up-keep is the one that is going to sell lots—and, as in most undertakings, the aim is to make it pay. The cemetery of to-day often covers acres. Its size demands care in location and layout. This is the function of the landscape architect and the city planner, and they are meeting the demand for such service.

A Truck Equipped to Operate Large Valves

DETROIT, MICH., is keeping up with the modern idea that machinery should replace hand labor wherever possible. Among the 83 Packard motor trucks owned by Detroit is one equipped with a device for opening and closing the gates in the huge water-mains by power. As shown in the picture, the truck is driven so that the shaft is directly over the valve. If the valve is reached through a small opening, this is easy; if it is reached through the manhole, an arm, which is fastened on a pivot just back of the left front fender, is swung around in position, and a pointer, which is fastened to this arm, is brought directly over the valve on one hole. The pointer is then removed, and a shaft, shaped to fit the valve on one end and the drive-shaft on the other end, is placed in position on the valve.

By means of the hand wheel, shown on the screw in the picture, the operator screws the drive-shaft down until it connects with the auxiliary shaft. A lever meshes a gear in the driving mechanism of the gate-closing device with a gear in the transmission, and upon letting the clutch in, the motor is connected and the gates are easily and speedily closed.

In the body of the truck are four large lockers containing all the necessary equipment, such as blocks, wrenches and tools of various kinds, rubber coats and rubber boots, gas-masks, and a book of blue-prints showing where all the gates are located and the kind and size. Just back of the driver's seat at the left hand side is a chart showing the number of turns required to close or open each different kind of gate. When the connection is made with the gate valve, the driver, whose motor is running, connects the gears of the transmission with the gears of the gate-closing mechanism and lets the clutch in.

An automatic counter registers each turn of the shaft, and when it registers the required number of turns for that particular kind of valve, the driver immediately disengages his clutch. This outfit is very valuable in winter, though little used in summer.

OPENING A LARGE VALVE IN A WATER MAIN, DETROIT, MICH.

An Administration of Municipal Water-Works

The Success of Operation Under Boards of Trustees

EVERY municipal water department should be conducted as a separate "administrative entity" and should be entirely separated from the general city government. Such a policy necessitates the conferring of broad and extensive powers upon the administrative body, such as are usually exercised by a private corporation engaged in supplying water for public uses.

The division of authority between the body administering the water plant and the officers conducting the general city government has not proved workable and does not contribute to efficiency in either department. The business of supplying water when conducted by a municipality is first and always only a business and should be managed and conducted solely as a business, not for the purpose of obtaining the largest possible revenue, but to attain the greatest possible efficiency and to supply, at a moderate charge, all public requirements. Being a business, questions of general public policy and civic improvement, ethical and moral laws and regulations find no proper place in the operation of a water system. The persons chosen for constructing and operating a municipal water plant should be chosen for their technical knowledge of the particular enterprise which is to be committed to their charge. Knowledge of the broader questions of municipal government in no way qualifies individuals with the technical knowledge to successfully operate a water-works system.

An attempt to operate the water system as a distinct part or branch of a general scheme of municipal government, whether that government be conducted by a political body elected in the manner generally prevailing throughout the United States, or by commissioners under some modification of the city management plan, will usually fail of achieving the efficiency which otherwise would be obtainable, for the reason that general city officers, or the officers conducting the general city government, are chosen from time to time upon issues involving questions of ethics and morality and the general policy of the government which have no relation whatever to the business of managing the water system. Upon such issues the people divide and give effect to the particular policy or scheme of municipal government which, for the moment, is the most popular. The experience of the candidates for city offices in conducting a "business" enterprise forms no part of the general debate and is not passed upon by the city electorate in choosing officers. From the very nature and fundamentals of the usual city administrative body, the officers chosen by the people to conduct the general city government rarely possess technical knowledge or experience in any given line of business. This results in loss to those branches of the municipal government which are purely "business" in their nature.

The reasons briefly outlined led the municipality of Clarksburg, W. Va., to take steps to separate entirely the construction and management of its water-works plant and system from the general scheme of the municipal government and to place it under the control of a governing body to be chosen solely because of their qualifications to conduct that particular business. A vote cast in selecting a member of the administrative body which controls the water-works system does not in any way reflect the sentiments of the voters on ethical and moral questions or questions of general public policy in the administration of the general city government. The choice is based entirely upon the qualifications of the party voted for, to conduct that one particular business. The result of this scheme is that experts possessing technical and general knowledge of the subject are placed in charge of an enterprise that is of a strictly business character, and a degree of efficiency is obtained in administering the particular business which has not generally prevailed in municipal governments throughout the country.

Excerpts from Clarksburg, W. Va., Charter

The Clarksburg, W. Va., Water Board, herein created when this act goes into effect, shall supersede the water-works and sewage board created by Chapter XII of the Acts of the West Virginia Legislature,

Session 1909. The Water Board shall at its first meeting, or as soon as practicable thereafter, appoint a General Manager for the water-works plant and system of the city. The General Manager shall act as Secretary for the Water Board, and shall be treasurer of the Water Board. Said Board shall have the power to employ such hydraulic engineers, mechanical engineers, and other technical experts, attorneys, assistants, agents or other employes as they shall at any time deem necessary for the good of the public service. They may create, fill and discontinue employments other than those herein prescribed, according to their judgment of the needs of the department.

Department of water-works shall be "an administrative entity" separated from the general city government and administered by the Water Board, elected for a term of three years.

In order to prevent the pollution of the waters from which the people of the city take water for domestic uses, the jurisdiction of the Water Board shall be coextensive with the location and extent of the waters from which such supply is taken, except that in no event shall such jurisdiction exist within any other incorporated city or town.

Power of Eminent Domain.—The Water Board as herein created shall have the right under the power of eminent domain to condemn, acquire and appropriate any property and acquire the fee simple title or any lesser estate or easement therein for any public use, whether said property be located within or outside of the corporate limits of said city, including the right to acquire property for the construction and maintenance of sewer lines, sewage disposal plants, water lines and mains, pump stations, reservoirs or reservoir sites, dams for storing water, and the right to create storage reservoirs by flooding adjacent properties, and for every other purpose required in the construction, maintenance and operation of water systems and plants for the purpose of supplying water to the public. The proceedings to acquire such lands, estates, or easements shall be the same as provided by general laws of the state of West Virginia for condemning and appropriating private property for a public use.

The Water Board is empowered to fix, regulate and change rates and charges for water supplied to all consumers, and to adopt and prescribe rules and regulations which shall be observed and obeyed by all consumers in reference to the use and consumption of water taken from city mains; the terms and conditions upon which connection to the said mains shall be permitted, and the place and manner of making the same; to fix penalties by way of additional charges for failure to pay water rents promptly, and to this end may discontinue the supply of water of any consumer who fails to pay for the same as required; to require all users of water for temporary purposes to pay for the privilege in advance; to refuse to furnish water to any building or habitation in the city unless the owner thereof shall assume liability for the payment of the charges for the water so furnished; to charge the cost of installing water service lines from the curb line to the mains against the landowner, and to require the payment in advance for installing such line and making connection with the water main; whenever the City Council shall determine to pave or repave any street, the Water Board is authorized to make a proper connection and lay a water service line from the main to the curb for each and every lot or for any part of a lot under separate ownership, although no water service may at the time be necessary or required for any such lot or part of lot, and to charge the cost of making such connection and laying such water service line against the owner of the property, and the cost of laying such water service lines and making such connections shall in every instance be a lien upon the lot or part of lot to be benefited thereby, and the Water Board shall have the right in the name of the city to institute and prosecute any proper suit in the circuit court of Harrison County, W. Va., for the collection of such charges by a sale of the property on which the same constitutes a lien.

Plumbers are required to pass examination and obtain certificates of competency. The city may require all persons who engage in the business of plumbing to pass an examination and obtain a license or certificate for such purpose. For this purpose there is hereby created a board of examiners of four persons to consist of the Superintendent of Public Welfare and the General Manager of the Water Board and of two other persons selected by them, one of whom shall be a master plumber and the other a journeyman plumber. The license shall be for such term or period as may be prescribed by the examining board. The Superintendent of the Department of Public Welfare and the General Manager of the Water Board shall not receive any compensation for serving on the board of examiners, but the additional members shall be entitled to a sum not exceeding $5 a day for each day of actual service, to be paid out of the funds of the Water Board. The General Manager of the Water Board shall be ex-officio secretary of the board of examiners, and he shall make out and certify, and the Superintendent of the Department of Public Welfare shall countersign all certificates of licenses, and said secretary shall keep and preserve all papers and records relating to the work of said board. The board shall be governed by any ordinance in force in the existing city of Clarksburg when this act goes into effect, or which may be passed by the Water Board.

A Success in Iowa

An increasing number of cities are placing the management of their water-works under a board of trustees of three or more men, who receive a nominal remuneration and usually serve for periods of about six years, one new member of the board being elected every two years. This scheme insures continuity of policy and takes the management out of the hands of politicians, and at all times there is at least one member of the board who knows the past policies and future prospects. Such a board exists in Ottumwa, Iowa, where it has produced great satisfaction. The Commission has been able to keep politics entirely out of the water-works, and each succeeding administration has been true to the precedent that was first set. The Commission is handling the business efficiently, has had in its employ for a number of years a good engineer, and has generally acted on his advice, especially in all technical matters. The Commission has all routine power, but in cases of special expenditures the Council must take the final action.

In Cedar Rapids, Iowa, the actual management and operation of the water-works—pumping and station and office—are carried on distinctly separate from all other city departments. The Board collects its own returns, pays its own bills, purchases its own supplies and keeps a separate bank account in the name of the "City Water Works." At the end of each week a check is turned over to the City Treasurer to cover whatever is in the bank and then a warrant is drawn against him for the payment of all bills, and the City Treasurer in turn keeps the water-works funds separate from other city money. This is a much more satisfactory method of handling the department than could possibly be arranged were it in the hands of the Mayor and Coun-

cil, for, with an election held every two years, there are a great many appointments made solely for political reasons, regardless of whether the appointees are qualified to fill the office for which they are named or not—in which latter case the department always suffers.

The Situation in Mason City

The Chamber of Commerce of Mason City, Iowa, has been working for almost a year in an endeavor to secure a Board of Trustees for the operation of its municipal water-works. A petition with a number of names was circulated and handed to the City Council. The Council delayed making a canvass of the petition to see that it had been properly signed by qualified electors of the city, because they were opposed to giving the people an opportunity to express themselves on this question. Late this spring, however, when the City Council learned that it would be necessary to get the endorsement of the voters of the city for a bond issue of $300,000, the assistance of the Chamber of Commerce was sought in putting over the election, with the promise that if this assistance was forthcoming, an election for a Board of Trustees would be called at any time the Chamber of Commerce committee requested it.

Accordingly, the bond issue was placed before the people at the time of the election on June 7, 1919, and was carried. Very soon thereafter, July 27 was set as a date for a second election for the bond issue. At this time, the Council did not consult the Chamber of Commerce, figuring that the election could be carried without assistance, but when the committee learned this it insisted that an election for a Board of Trustees be held at the same time as the election for the bond. This was agreed upon, and the Chamber of Commerce undertook to create sentiment in favor of both propositions. The utmost publicity was given, and the city was thoroughly organized in each ward and precinct. Checkers were provided in each of the polling places, and automobiles worked during the entire day to bring out the votes. The result was: for the bonds 1,473, against the bonds 155; for the trustees 1,053, against the trustees 584. The proposition to have a Board of Trustees for the management and control of the water-works carried, while the bond issue failed to carry in spite of the large majority in favor of it. The law stipulated that in order to carry a bond issue of this kind, a majority of those who voted at the last general election must be in favor of it. This required a total vote of 1,651 in favor of the bonds, which was not accomplished.

If the proper men are appointed on the Board of Trustees, it is altogether probable that another election will be called, so that a bond issue can be carried. Many business men did not vote for the bonds because they did not know who would spend the money. The proceeds of the bonds were to be used for new improvements and additions to the water-works systems.

The Waco Water-Works

The municipally owned water-works of Waco, Texas, are maintained and controlled by a Board of five Water Commissioners. The charter provides that no two of them shall be from the same ward of the city, and they are elected by the voters at large and serve without remuneration. Further, these Commissioners are ineligible to hold any remunerative office in the Water Department while a member of the Commission, or within one year after the term of office of two years. In Waco, two members are elected at one election and three the following year. The Board has complete charge of the management, maintenance, improvements, extensions and enlargements of the water-supply, either within or outside of the limits of the city, and it can acquire by purchase, donation or condemnation, suitable grounds, water privileges, rights of way and other property rights and privileges necessary for the efficient operation of the plant.

The Board is empowered to fix water rates, providing that the rates shall be sufficient only to raise in any one year an amount equal to one year's interest on all water-works bonds issued by the city and to defray all of the operating and incidental expenses and depreciation on the plant. The Superintendent of Water-Works and the Secretary are elected by the Board. All money due the Water Department is collected by the Secretary of Water-Works and deposited with the City Treasurer, and credited to an account "The Water-Works Fund of the City of Waco." All payments are made as a draft on this fund.

The Management of Denver's Plant

The water-works of Denver, Colo., are administered by a Board of Water Commissioners of five members, created by an election held August 6, 1918. The amendment to the charter which was approved by the voters at the above election created a non-political Board of Water Commissioners of five members to have complete charge and control of the water-works system and plant supplying the city and county of Denver with water. The amendment carried with it the election of five members for varying terms and stipulated that on the second Monday in June, 1919, and each two years thereafter, the Mayor shall appoint one or two commissioners, as the case may be, for terms of six years each to succeed those whose terms expire. The Commissioners each receive a salary of $600 per year and are required to give a bond in the sum of $5,000. A fine of $25 is imposed on any member of the Board who is absent from a regular meeting except on business of the Board, and when a member of the Board is absent from three successive regular meetings, unless excused on account of sickness or other unavoidable reasons, to be determined by the Board, he ceases to be a member of the Board and his case is filled by appointment as in the case of other vacancies. The Board is given complete charge of the operation of the management of the water-works, holding property in the name of the city and county of Denver.

The charter provides that the entire cost of the operation and maintenance of the water-works system and plant, including the salaries of the Board and its employes, and extensions, additions and betterments, shall be paid from the water-works fund. No indebtedness created by the Board in any year can be a charge against the revenue for any succeeding year, and further provision is made that no money shall be expended from the revenues of the water-works for additions, extensions and betterments in any year until maintenance, operation and interest charges for the current year have been provided for. This clause is probably one of the reasons for the unfortunate condition of affairs in Denver at present, as the water-works is in financial straits.

The method of appointment of commissioners as stated above is such that it is possible for a mayor whose term of office is four years to change the membership of the Board of Water Commissioners so that a majority of the Board will be appointed by him. Under present conditions, three members will be appointed in the term of the present mayor, three during the term of his successor, and four members of the Board during the term beginning June 1, 1927, and ending May 31, 1931.

In Kitchener, Ontario, Canada

A Board of Water Commissioners, composed of four men, elected by the vote of the people for two years, two being elected each year, has complete control of the water-works of Kitchener, Ontario, Canada. The Mayor is also a member of the Board. Politics has practically nothing to do with the election of the Commissioners. Of the four present Commissioners, three have been members for long terms, one since 1899. The Board has practically the same power as the City Council, except that it cannot hold property in its own name, all deeds being held in the name of the city. Because of this, any debenture issues must first pass the City Council, but they have no control over expenditures. The Commissioners serve without salary. They hold regular monthly meetings and occasional special meetings.

The Chance of Fire

Ninety-one cities of the United States reported for their cities the number of fires for each 100 buildings in 1919. The average for these 91 cities is 2.86 fires per 100 buildings. If these fires were all in separate buildings, it would indicate a fire in every 36th building once each year. Howeer, since these fires are concentrated to some extent in industrial and mercantile occupancies, it is safe to assume that among the aerage occupancies of this kind there is a fire each year in the 25th or 30th building housing them. The man who invests his money in fire protective devices for guarding occupancies of this kind is not taking a very long chance on the possibility of using them over a period of a few years.

—*Fire Protection*, June, 1920.

Resurfacing An Asphalt Block Pavement in Sarnia, Canada

By R. L. Dunsmore

Assistant City Engineer, Sarnia, Ontario

THE question of resurfacing the asphalt block pavements in Sarnia became a problem in 1918, when the condition of the streets with this type of pavement became so bad that some immediate action was imperative.

During the years 1904 to 1908 approximately 58,000 square yards of asphalt block pavement was laid. This consisted of a 3-inch asphalt block laid on a cement mortar cushion and a 5-inch concrete base. The specifications called for the cushion to be cement mortar, one part cement to three parts sand, and the base to be one part cement to six parts river gravel hand mixed. The blocks were supplied by the Ontario Asphalt Block Company, and the pavements were guaranteed for ten years by the contractor.

In 1915 the pavement stood in great need of repairs. The city decided that the remedy lay in giving the blocks a carpet coat of some mixture. Accordingly, a contract was let for the resurfacing of a portion of the block pavement with Dollorway. This consisted in covering the existing pavement with a skin coat of a tar preparation and crushed stone chips. The contract price was 35 cents per square yard, and the skin coat was guaranteed for two years.

This Dollorway, while giving the road a smooth surface, began to chip off and disintegrate at the end of one year, and the contractor had to repair it during the second year. Nothing further was done to repair the pavement until 1918.

In 1918 the City Engineer, J. A. Baird, reported that 5,070 square yards of the pavement was unfit for traffic. As a result of this report the matter of permanent repairs for the pavement was resumed. A report on the pavement was made by the Paving Department of the Milton Hersey Company, Limited.

The following is the report on the test on one of the blocks:

		Result of Tests of Sample	Model Mixture	Min. Specifications	Max. Specifications	Totals
Bitumen		7.8%	10	8	12	
Passing	Held on	Note.—Figures give percentage by weight.				
200	mesh	16.3%	10	7	14	Not less
100	200	5.2%	9			than
80	100	0.5%	9	7	25	18
50	80	3.0%	16	3	25	11 to
40	50	3.3%	7	3	18	36
30	40	4.7%	6	3	14	7
20	30	7.8%	4	3	9	to
10	20	17.7%	2	2	6	25
4	10	29.0%	18	11	25	20 to
2	4	4.7%	9	4	10	35
Mesh	2			Penetration of asphalt cement—hard.		
Totals		100.0%	100			

The second way of repairing the pavement—that of removing the asphalt blocks and laying a new top—is merely a matter of choosing the sort of surface best suited to the conditions in hand. No block pavements of any sort were considered. Penetration macadam or sheet asphalt was then to be chosen. The former proved to be cheaper than the latter. The company which afterwards did the work quoted $1.70 per square yard for the one as against $1.92 per square yard for the other, in June, 1918. However, the City Engineer of Sarnia chose the sheet asphalt.

His reasons were these: the greater permanency; and the better surface, which suited the local conditions in that the streets are wide and the grades flat, and because the street carries very heavy city traffic, being the main artery of the city and nearly half of the pavement having a track allowance in the center of the street.

Specifications were drawn up calling for the removal and disposal of the asphalt blocks; the removal of such portions of the concrete base as in the opinion of the City Engineer was not sufficiently strong to carry the sheet asphalt; a new base laid in such spots; the laying of a close binder course

1½ inches thick above the normal surface of the concrete base; and a surface course 1½ inches thick on the top of the binder course.

On the removal of the blocks, several stretches of the concrete base were in such poor condition that it was necessary to tear out the old concrete and lay a new base.

The binder course was quite similar to a bitulithic pavement. It was rolled first with the tandem roller and given its final compression with a 12-ton roller, which forced it well down into any hollows in the base.

The noteworthy points brought out by this report are the low percentage of bitumen, its hardness, and the low percentages of aggregate passing the 100- and held on the 200-mesh sieve. The latter do not compare at all favorably with the report of the model stone-filled mixture, which represents a good asphalt block mixture laid in sheet form.

The Hersey report of an inspection of the pavement showed that practically all of it was badly and very unevenly worn, rendering patching impractical, for any new blocks inserted would stand higher than the old ones. In less worn areas the blocks were worn along their edges, producing a rough surface at best. Also, if all the blocks that were worn more than 20 per cent were replaced, the resulting surface would be too rough for a city street. These defects were other than those caused by a defective concrete base.

Sarnia being a small city and having no paving equipment of its own, and especially after both the pavement itself and the skin coat had proved failures, the City Engineer determined to spare no effort in securing the most exhaustive information from all sources on the subject of resurfacing block pavements.

Among those consulted were the Ontario Department of Highways, which sent a representative to Sarnia, who went over the proposition thoroughly, Mr. Gray, the Roadway Engineer for the Imperial Oil, Limited, A. Proctor, asphalt expert for the city of Detroit, The Milton Hersey Company, Limited, of Montreal.

There are two general methods for the repair of asphalt block pavements, each of which may be subdivided:

1. Laying a new surface on top of the asphalt block
   (a) A skin or carpet coat over the whole surface
   (b) The disintegrated surface of the blocks removed by a surface burner, and a 2-inch course of sheet asphalt laid

2. The blocks removed and an entirely new surface laid on the concrete base
   (a) Sheet asphalt
   (b) Bituminous or penetration macadam
   (c) Vitrified or wooden blocks, etc.

The skin or carpet coat may be applied in various ways. The city of Stratford has had much the same experience with asphalt blocks as Sarnia. The method used there was to bring the whole surface of the street to a common level by filling all holes and worn spots in the pavement with Tarvia X; then a carpet coat of Tarvia B was laid over the entire street. At the time of writing, this is giving good service, but it has not been in place sufficiently long to assure its permanence.

The second method of resurfacing the asphalt blocks is more generally advised than the first. The whole pavement is gone over with a burner or surface heater, a portion of the blocks being scraped up and the surface of the remainder softened. While the surface is still hot, a 2-inch coat of hot mix asphalt is applied in the ordinary manner. This method has been used to some considerable extent by the city of Toronto, but, as in the case of Stratford's experiments, this resurfacing has not been in place long enough to insure that it is a reasonably permanent remedy.

The difficulty with these methods is that in general practice not only are many asphalt block streets pot-holes, which makes it impossible to apply a 1-inch surface, making in reality a much heavier surface over the entire pavement, but the blocks are deteriorated throughout, being extremely porous on the side next the concrete base. This means that the vitality of the block is gone, and it is foolish to spend money trying to build a new surface on it.

So this method of resurfacing the blocks has been set aside as being too problematical a remedy to try again.

Where it was necessary to increase the crown of the road, the extra thickness was made up with the binder course. The surface laid on the binder was Standard sheet asphalt, the following being the mix specified:

		Result of Tests of Sample Submitted	Model Mixture	Specifications Min.	Specifications Max.	Totals
Bitumen		12.1%	12	10	14	
Passing	Held on	NOTE.—Figures give percentage by weight.				
200	mesh	14.3%	13	10	20	Not less
100	200	18.6%	13			than
80	100	11.8%	13	10	35	25
50	80	25.4%	23	4	35	15 to
40	50	7.6%	10	4	25	50
30	40	4.6%	8	4	20	10
20	30	2.4%	5	4	12	to
10	20	3.0%	3	2	8	35
Mesh	10	0.2%				
Totals		100.0%	100			

A large number of the old blocks were carted away by citizens and used for driveways, walks, etc., but though at the time it seemed as if a lot of good material was being thrown away, there has been no regret expressed or felt at the course advised and carried out by the City Engineer.

Summing Up Street Perils

A Warning from the Record of Newark, N. J.

THE danger which constantly exists in the streets of Newark, menacing human life and safety, is pictured vividly enough in the figures of the statistical compilation which the Police Department has completed showing the number and kind of vehicular accidents occurring in the four years immediately preceding 1920.

During that period 5,702 persons were injured in the streets in vehicular accidents, and 362 of these died in consequence of injuries sustained. That makes an average of four injured every day throughout the four years and of 1 death in every 16 persons hurt.

The saddest thing about it is that conditions as to the unsafety of the streets seem to be growing worse instead of better. There were 1,711 injured last year, an average of nearly five a day and an excess of nearly 500 over the record of 1916, notwithstanding changes that were supposed to be improvements in the handling of street traffic, warnings from the judges of the courts, indictments and convictions, punishment of offenders, revocation of automobile licenses, safety campaigns and the constant hammering of the press at practices that contribute to the evil. The list was longer last year than in 1918. The tabulations have not yet been brought down to date, but there seems to be ground for belief that, unless there is a change for the better, 1920's record will be longer than any yet.

It is interesting, though not surprising, to note that automobiles figured in the largest number of accidents, and these contributed about fifty-five per cent of the whole number of street accident victims. Of 999 motor vehicle accidents in 1919, passenger cars figured in 612, commercial cars in 229, jitneys in 99, taxis in 14 and motorcycles in 45. There were fewer trolley than jitney accidents last year, while the reverse was true the preceding year.

In the four years covered by the survey, 423 were injured by jitneys and 396 by trolleys. The cars figured in more fatal accidents than did the busses, the score for last year being 11 deaths from trolleys and 5 from jitneys, and for the four years 44 from trolleys and 27 from jitneys. Railroad accidents within the city limits appear to be on the decline, and mishaps in which horse-drawn vehicles figure also show a gradual reduction. Next to automobiles, collisions, separately classified, contribute to the greatest number of injuries, although the death rate attending this class of accident is very low, 8 deaths resulting last year in a total of 548 injured.

One of the most significant of the summaries of the compilation is that relating to responsibility. It appears that in the largest number of cases the person injured was found to have been responsible for his misfortune. In 4,408 cases studied, it was found that in 2,654 the injured person was at fault, while in 1,754 instances—just 900 less—the responsibility was upon the driver of the vehicle. The moral of this revelation is that carelessness is an undesirable quality that is found in no one class and most frequently reacts harmfully to those who display it.

— An editorial from the *Newark News*.

Road Construction Problems in Wyoming

Data from State Highway Department Show that Wyoming is Taking Vast Strides to Open Up the State by Well-Planned Road Construction

ALTHOUGH Wyoming's Highway Department as now operating has been organized only since March 1, 1919, there are under way road and bridge projects totalling $4,500,000 which are scheduled for completion during the current construction season, and the end of the season will witness a total of $6,000,000 in road projects under way and completed.

The area of the state of Wyoming comprises approximately 98,000 square miles, with an average population of 1½ persons per square mile. Of the total area of the state, the United States Government still retains title to slightly over 63 per cent. There is in use in the state approximately 16,000 miles of roads and trails.

Of the total road mileage above, it is the plan of the State Highway Department to designate and maintain as the state highway system an approximate total of 2,000 miles of roads by January 1, 1921. Approximately 800 miles of this amount is now under construction. The remaining mileage will be reconstructed with heavy grading machinery this season, and permanent patrol maintenance will be established over the entire proposed system.

Types of Roads

Wyoming is building three types of roads, namely, earth, gravel or shale surfaced, and permanent surface of cement concrete and Warrenite. Earth surface is specified where traffic is light or the road material available is such that construction under proper maintenance will care for the light traffic existing at present or to be expected in the future under normal conditions. For earth roads, the same care is used in location and laying grade lines as is exercised in laying out the more important highways. This type usually has a road width of 20 feet with a "V" ditch 1 foot deep by 4 feet wide and a raise of crown of 9 inches. Surface ditches, drainage and outlet ditches are provided to completely handle all water. The maximum grade used is 7 per cent, with no curves sharper than 28 degrees.

During the course of construction of earth roads, contractors are permitted to use machines of either the blade or elevator type, but are required to produce a road-bed of the grade and cross-section specified in the plans. When elevators or scrapers are used, contractors are required to leave a berm of 5 feet on each side of the roadway between the toe of the slope and the borrow-pits. All earth work is paid for by the cubic yard on an embankment basis, which also includes clearing and grubbing for road-bed and borrow-pits.

Drainage Structures

Standard-type drainage structures are used on all classes of construction, comprising galvanized corrugated iron pipe, reinforced concrete boxes and reinforced concrete bridges of the T-beam type. On earth roads all structures are designed to carry a load of 10 tons, and have a roadway width of 16 feet. Steel bridges are sometimes used where the span required exceeds 50 feet and the nature of the stream requires a clear span.

All corrugated iron pipe used is of open hearth steel of 16-gauge metal for pipe 15 and 18 inches in diameter, and of 14-gauge metal for pipe of 24 inches diameter and greater. No pipe of a smaller diameter than 15 inches or larger diameter than 36 inches is used. Galvanizing specifications require not less than 2 ounces of pure spelter per square foot, evenly distributed.

For drainage areas requiring a larger opening than afforded by two 36-inch pipes, concrete box type culverts up to 15-foot span, and 10 feet in height are used. A structure with gravity walls and reinforced slab top, with stream-bed left unimpaired, has proved to be a very economical type.

Reinforced concrete bridges can be built in Wyoming at a cost approximating 10 per cent less than steel structures of the same span width. Gravel surfacing of 4 inches depth is used to protect the slab floor of concrete structures from direct wear.

Road Surfacing

Gravel and shale surfacing is used, where the local materials are not sufficient to care for the traffic needs. Gravel or shale

A 20-TON HOLT TRACTOR OWNED BY THE WYOMING STATE HIGHWAY DEPARTMENT CROSSING THE BELL FOURCHE RIVER

The amount of earth moved in one operation can be plainly seen in the rear of the second grader. This equipment has been used for grading and reconstructing earth and gravel surfaced roads, and is one of the most economical outfits in the Department.

is placed on the more important roads, which have a roadway of 24 feet between ditches and a rise to crown of 7½ inches. Specifications require a width of surfacing of 15 feet with an average thickness of 6 inches, placed on a level subgrade. The construction of the earth shoulders, either before or after the placing of the surfacing material, is optional with contractors.

Gravel surfacing is specified of such size as to all pass a 2½-inch ring and not less than 50 per cent be retained on a ¼-inch screen, and to contain between 20 and 30 per cent of clay, shale or other binder.

The same percentage of clay, loam or silt for binder is allowed in shale surfacing.

Surfacing material is laid in one course and dragged daily until compacted by traffic any unevenness which may develop while the road is being compacted is taken care of by adding material or by scarifying and reshaping. Payments to contractors are made on the basis of the number of cubic yards of surfacing material in place plus an additional sum per cubic yard for each ¼-mile overhaul, beyond the free haul limit of one mile.

Drainage and grading specifications for gravel and shale surfaced roads are standard with those of earth, with the exception that concrete culverts and bridges are designed to carry a load of 15 tons and have a roadway width of 18 feet.

Concrete Roads

Concrete surfacing has been placed on only two projects in Wyoming to date, namely, a 5-mile section north of the city of Casper on what is known as the Salt Creek Road, which connects that city with the large oil fields at Salt Creek, and an 8-mile section in the Little Goose River valley in Sheridan County which was constructed in lieu of a proposed railroad.

The 5-mile section is 16 feet in width and has an average thickness of 6-1/3 inches. The first 10 miles of the latter project is 16 feet in width, and the remaining 3 miles 10 feet in width. The material specifications for both projects were identical, providing for a one-course pavement of a 1:2:3 mix. River-washed sand and gravel was used, being graded down from a 2-inch diameter stone with not more than 5 per cent passing a 100-mesh screen. Expansion joints ¼-inch in width were placed every 30 feet and filled with an asphalt joint filler. Both the pavements have been subjected to a very heavy traffic for the last 18 months, with no cracks or apparent deterioration.

The Growth of Akron

What the Fastest Growing City in the United States Owes the Rapid Expansion of the Automotive and Rubber Industries

AKRON, OHIO, the prodigy child of the automotive and rubber industries, to-day has the distinction of being the fastest-growing large city in the United States. According to the Census Bureau of the Department of Labor, the city's population increased 201.8 per cent during the last decade, leaping from 69,067 in 1910 to 208,435 at present.

Credit for the phenomenal growth of Akron during the last ten years is divided between the rubber industry and the automotive industry. Working together, these two industries lifted Akron from obscurity and placed it high among the foremost manufacturing centers of the world. Twenty years ago there was nothing unusual about Akron; it was hardly known outside the state. Those who knew of its existence thought of it as "that little city up in the hills of northern Ohio where sewer pipe, breakfast foods and farm implements are manufactured."

Then, suddenly, Akron began to grow. Factories sprang up, and thousands of new homes were built. The word went out that Akron was "a real town, where money could be made," and men and women began coming to the city from all sections of the country. During this period when Akron's growth began getting under way, there were many who classed the city with the "boom" towns which sprang up one day and settled down into mediocrity the next. But they were wrong. Akron's growth continued, year after year.

Marvelous as this growth has been, the reasons for it can be easily given. Ask an Akron resident why the city has leaped ahead and he will answer with one word—"rubber." The automotive industry shares in the credit for making Akron, because it caused the expansion in the rubber industry. When the automobile was invented, a need arose for rubber tires which would prevent the machine from being jarred to pieces. Akron rubber factories supplied this need, and in so doing expanded out of all proportion to their former size. And as the rubber factories grew, so grew the city.

Although Akron has been before the public eye only a comparatively few years, it is one of the oldest cities in Ohio. The first settlement within the territory which now comprises the city was made in 1807, at Middlebury on the Little Cuyahoga

THE HEART OF AKRON, LOOKING NORTH ON MAIN STREET

ORIGINAL BUILDING OF THE B. F. GOODRICH RUBBER COMPANY AT AKRON

River, where plenty of water was available, and for many years it was the market town and commercial center of a large section of northern Ohio. Akron was incorporated as a city after an enumeration showed it had a population of 5,066. From then on the city grew steadily, participating in the increasing activity given to commerce, manufacturing and agriculture by the Civil War. The advent of railroads made it possible for the city to reach markets which were inaccessible before and to compete with other cities. The first railroad, a branch of the Cleveland & Pittsburgh, entered the city in 1864. To-day Akron is on the main lines of the Erie, Pennsylvania, and Baltimore & Ohio and is connected with the Wheeling & Lake Erie by the Akron, Canton & Youngstown, and with the New York Central by the Northern Ohio.

Prior to the twentieth century Akron acquired some measure of fame as a manufacturing center through the manufacture of clay and cereal products, farm implements, cast iron products, binder twine and matches. It was almost by accident that Akron became the center of the rubber industry.

In 1867 Dr. Benjamin Franklin Goodrich started a rubber factory in Hastings-on-the-Hudson, N. Y. The venture was not a success, and after a year Dr. Goodrich moved his plant to Melrose, N. Y., where he started again after securing financial help from a friend. Competition of other eastern rubber factories proved so keen, however, that this venture turned out to be as much of a failure as the other, and Dr. Goodrich decided that it would be advisable to relocate in the virgin fields of the West. He was attracted to Akron by an offer of financial assistance from several Akron men, and in 1870 moved his plant to that city. He started manufacturing in a building 40 by 100 feet, with a force of 35 employes.

The company encountered only a small measure of success at first. It struggled along, often on the verge of bankruptcy. Many of the original stockholders became discouraged and dropped out. In spite of bitter disappointment, however, Dr. Goodrich finally secured the financial assistance which enabled him to place the company on a paying basis.

In the years which followed, the business grew steadily. Rubber goods came into

THE B. F. GOODRICH RUBBER COMPANY TO-DAY. THE ORIGINAL PLANT COULD BE TUCKED AWAY IN ANY ONE OF ITS LARGER BUILDINGS AND LOST. THE COMPANY NOW HAS 63 BUILDINGS, COVERING MORE THAN 100 ACRES. IT EMPLOYS 26,000 PERSONS

more common use, and several additions were made to the original "smelly little shop by the canal." Other important rubber companies were founded in Akron, including Firestone, Goodyear, Miller and Swinehart, and soon the industry was centered in the city. To-day Akron manufactures fully half of all the rubber goods made in this country.

The rubber industry received its first great impetus when the bicycle was invented and rubber tires were needed. This impetus was as nothing, however, in comparison with that given when the automobile came into use. The first tire, which was made at the Goodrich factory, was a curious affair. It had sixteen plies of fabric and a tread an inch and a half thick. Experts say it was the best tire ever built and at the same time the poorest—it burned itself out before going 500 miles. Improvements on the tire came fast, however, and by the time automobiles ceased to be a luxury and became a necessity of everyday life, first-class tires were made in quantity.

As the demand for automobiles increased, the factories expanded. Numerous additions to existing plants were made and many thousand new employes added. In 1910, 4,000,000 tires were manufactured in the city, but, large as this production was, it proved to be just a beginning. In 1915, 10,000,000 tires were manufactured, and last year 20,000,000. To-day tires are being turned out at the rate of one a second, indicating a production of at least 30,000,000 for the year.

As a result of this increase in production, a flood of gold has poured steadily into Akron, making it one of the most prosperous cities in the country. The sales of the rubber companies amounted to about $40,000,000 in 1910. In 1915 they totaled $121,085,000, and last year jumped to $427,796,000. A large part of this income was turned over to the employes of the companies, the pay-roll last year amounting to $101,178,000.

The expansion of the rubber industry resulted in a corresponding growth of the city. In 1910 the rubber industry employed 13,631 persons. It now employs 86,000, and the number is constantly increasing. Great difficulties have been encountered in housing the incoming thousands. Homes could not be built fast enough to supply the demand. When the war practically put a stop to all building, the situation was further aggravated. Last year, however, great steps were taken in home construction, and at present only the scarcity of building materials is preventing the work from being carried on.

Besides leading the country in population growth, Akron claims distinction for many other things. Labor troubles are practically unknown in the city, simply because the factories have always made it a policy to pay high wages and provide good working conditions. Various means have been adopted by the companies to make the employes feel that they are partners in the business rather than merely hired hands. Club houses and gymnasiums have been erected for the employes' use, libraries have been established, medical and dental service is furnished without charge, and assistance is given in the purchase of homes. The Akron plan of Americanization work has been adopted by the entire country, and the Akron system of promoting amateur athletics in the industries has been used as a model for similar work in numerous other cities.

New Building in American Cities

The following is a list of the leading cities in new building for the first six months of 1920, sent out by the Bureau of Publicity of the Omaha Chamber of Commerce:

	City	Population	New Building First Six Months of 1920	Per Capita
1	New York...	5,621,151	$169,966,062	$30
2	Chicago	2,701,212	50,256,600	19
3	Detroit	993,739	48,733,800	49
4	Cleveland ...	796,836	41,162,575	51
5	Philadelphia..	1,823,158	38,570,395	21
6	Los Angeles..	575,480	24,197,639	42
7	Baltimore ...	733,826	19,103,413	26
8	Boston	747,923	17,253,115	23
9	San Francisco	508,410	14,873,516	29
10	Akron	208,435	14,201,132	68
11	Newark	415,609	13,825,817	33
12	Milwaukee ..	457,147	11,365,891	25
13	St. Louis....	773,000	10,701,603	14
14	Omaha	191,601	10,574,265	55
15	Washington..	437,571	10,322,035	24
16	Minneapolis..	380,498	10,047,920	29
17	Atlanta	200,616	9,080,533	45
18	Kansas City..	313,785(est.)	8,932,055	29

Forward Steps
Reported to THE AMERICAN CITY by Municipal Officials & Department Heads

Recreation Departments

A Modern Swimming Hole

MINNEAPOLIS, MINN.—Camden Baths, in the north section of Minneapolis, is as close to the ideal swimming hole as a modern bathing place can be. Shingle Creek is dammed at a certain point, and the pent-up water is given outlet through the bathing pools proper, and allowed to empty into the creek below the dam. It is truly the old-fashioned swimming hole, with the snags and treacherous uncertainties eliminated, the bottom concreted at certain and uniform depths, and the dressers of green foliage replaced by fixtures of more safety and security. It is the swimming hole without the dangers, chances and inconveniences, and made modern by walled dressing space, steel lockers, concreted pools and adequate supervision. The pure, fresh air remains, for there is no roof.

The construction of a concrete dam, having a head of 8 feet, caused a lake to form, the overflow from the dam being run through pools. A fishway is provided on one side, and on the other two sluiceways with hand-operated gates, each about 2½ feet in diameter, are constructed to aid in the rapid disposition of flood waters. The spillway is about 24 feet long and the crest slightly above the intake of the pools.

The pools, one shallow and one deep, are located above the dam, their length parallel with the spillway of the dam, and the natural flow of the creek about 45 degrees to the dam and also to the pool. The pools

PAVILION AT CAMDEN BATHS. THE STREAM IN FOREGROUND PROVIDES WATER FOR THE SWIMMING HOLE

are flanked on one side by the locker rooms and on the other by a memorial field house, and an 8-foot concrete wall functions for the green foliage of boyhood days, in obstructing the view of the intruder. About 40 feet up-stream from the dam the water is let into the shallow pool through a 20-foot passage. The pool itself is from 3 to 4 feet deep, 60 feet wide, 125 feet long, concrete-lined, with a 10-foot concrete platform all around it. At the lower end the water is allowed to pass into the diving pool, which is likewise of concrete, 9 feet deep, about 45 feet wide and 45 feet long, allowing the excess water to flow over as in dam construction and falling 10 feet to the creek below the dam.

CHILDREN'S INTEREST BEGINS WITH SEEDLINGS

As has been mentioned, the locker rooms are at the side of the shallow pool, and it is through these rooms that bathers enter the baths. In the men's side there are 22 dressing rooms and about 250 lockers, most of the men using the benches between the lockers in preference to dressers. The women have 24 dressers for about 175 lockers, all using dressers, there being no benches in this department. There are showers in connection with the dressing-rooms as well as toilet accommodations.

These baths are always well attended, and on hot days as many as 3,000 bathers have made use of the facilities.

THEODORE WIRTH,
Superintendent of Parks.

Departments of Education

Cleveland Makes School Gardens Pay

CLEVELAND, OHIO.—This city believes in gardens as a community asset. Home garden cultivation and training for commercial gardening are both included in a program of the Board of Education in that city, which is carried oot so as to reach the family direct and influence many parents as well as the children. Gardening in the Cleveland school system is not a classroom abstraction, but a part of the home life.

In the course of the spring and summer the garden teacher comes to be a familiar visitor in many neighborhoods of Cleveland. When she calls on a youngster the mother and father take as much interest as anyone in the discussion of the garden. The child may be tending only a few rows in the family garden, or he may have a small piece of land to call his own. It is altogether likely that the weeds may have been working faster on the plot than he has, and insects may be threatening the life of the green things. The boy of ten or twelve years who would wage war on garden enemies must possess persistence, patience, and a fondness for the out-of-doors; he has need of all the encouragement and counsel a teacher can give him by way of reinforcement.

Possibly the young farmer may meet his teacher on a large tract garden, instead of at home. Because so many city-dwellers have no yards in which to garden, the Cleveland School Garden department maintains twelve areas, varying from a city lot to ten acres in size, where boys and girls are given individual plots to cultivate. Each gardener receives a section of 200 square feet or more. He pays for his own seeds and takes home or sells the produce, although plowing and fertilizer are usually furnished free and tools are lent for his use.

The youngster is encouraged to look upon his garden, whether at home or on a tract, as a business venture of his own. He is urged to keep accounts of his expenditures and receipts, and, if possible, to work a large enough piece of land so as to make a good profit from the sale of vegetables and flowers. A complete report of his progress is made by the teacher on each visit.

Interest such as this in gardening as a spare time occupation often leads boys and girls on to a more thorough study of the work. A class in horticulture at one Cleveland technical high school not only gives such students a background of theory, but also provides actual experience in propagating thousands of plants in a school greenhouse and truck garden. It prepares them for work with commercial growers or on large estates, or it serves as a preliminary course for those who wish to attend college.

Cleveland was a pioneer in school gardening as early as 1905, but the past three years have been notable for a very considerable increase in the proportions of the work. Since the close of the war interest has grown rather than diminished. The report of Supervisor Eastman for 1919 showed that 7,840 children who had home gardens, and 415 whose plots were located on the tracts, cultivated in all 175 acres and produced crops worth $79,835.

During the present season forty Cleveland teachers are engaged in this task of promoting the garden idea. As a "back to the soil" movement for the city dweller, it looms large in importance in these days of unrest and high prices, Mr. Eastman declares. Those who are engaged in the Cleveland work point to results which demonstrate its worth for the individual child and family, and for civic betterment.

KATHRYN MADDOCK,
Supervisory Assistant, Division of Educational Extension.

Park Departments

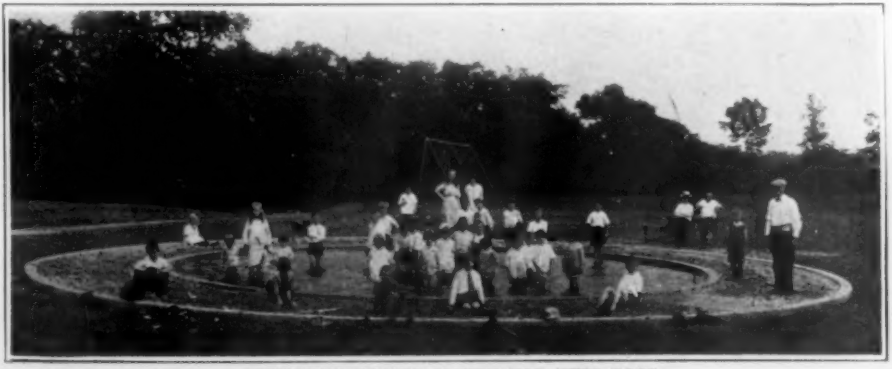
Children Organized to "Humanize" a Park

NEW BRUNSWICK, N. J.—For many years the city of New Brunswick, N. J., has had a pretty park, the gift of a former wealthy citizen, that seemed to supply many civic needs satisfactorily but lacked certain "human" factors that other city parks have. For a long time no one seemed to realize just what this lack was, until finally someone decided it was because there was not enough attraction there to interest children.

The *Sunday Times* of New Brunswick took the matter up and through its columns asked for petitions from local children who wanted a playground established in the city park, and the result was an avalanche of names—thousands being sent to the office during the first two weeks.

So a program was planned that called for about $5,000 worth of equipment and devices. Subscriptions and contributions began to come in and every child who earned a dollar and gave it to the *Times* for the Playground received a button badge that gives them a life membership in the Playground Founders League of New Brunswick. Over a hundred Founders joined before July 4.

One of the principal features under course



CHILDREN RAISED MONEY FOR THIS POOL

of construction at this time is a wading pool of concrete, 30 feet across, with a sand "beach" two yards wide all around it. This pool is two feet deep in the center and about two inches deep at the edge, so arranged that the water can flow continuously or be changed every so often by means of convenient valves. When finished, this pool will be one of the finest in the state. The entire project bids fair to create more than an ordinary amount of interest, inasmuch as the movement was practically started and carried out by the children of New Brunswick, and it is seldom, if ever, that so extensive an enterprise has been accomplished in this way.

Even if the complete program is not realized this summer, there is little doubt that next season the city will take the matter up and put it through, as the move is far too popular to die out—indeed, it is very doubtful if the energetic youngsters who are backing the plan would allow it to do so.

FRANK A. CONNOLLY,
City Commissioner.

City Managers

Where the Money Goes

Grand Rapids, Mich.—The citizen of Grand Rapids does not wonder what becomes of the money he pays out in taxes; nor is he obliged to decipher the columns of figures of the city budget. A glance at the circle of the "taxpayer's dollar" shows him what proportion of the funds is spent for education, fire protection, garbage collection, or any other municipal activity. This design is stamped on the back of the original and duplicate of every tax receipt issued by the city.

THE TAXPAYER'S DOLLAR

FRED H. LOCKE,
City Manager.

Highway Departments

Planning Prevents Steep Grades in City Streets

Birmingham, Ala.—About fifty years ago a land company was incorporated which acquired a number of farms for the purpose of laying out a town site which was named "Birmingham." The project dragged along for a number of years, passing through several boom periods and times of depression before it finally settled to a steady growth, which has resulted in a city of over 200,000 population.

The original town site was known as "Jones Valley," being bounded on the southeast by Red Mountain and on the north by a series of ridges approximately parallel to Red Mountain, the general trend of the valley being northeast and southwest. Along the center of this valley had been constructed the Alabama Great Southern Railroad, which passed through the town site on a tangent. The center line of the railroad was used as the base line and avenues laid out on either side parallel to the railroad, the streets being laid out at right angles to the avenues. For approximately a mile on each side of the railroad the land was approximately level, and consequently few grade problems were encountered in constructing the highways. The business portion of the city is from 500 to 600 feet above tide; the top of Red Mountain, which is about two miles from the center of the city, is from 1,000 to 1,100 feet above tide. The ridge on the north side is approximately 200 feet higher than the center of the city. The first maps made of the town site continued the rectangular layout to the top of the mountain on the south and to the top of the ridge on the north, which resulted, in many instances, in very steep grades. This layout has

NORWOOD AVENUE IS AN ATTRACTIVE RESIDENTIAL STREET. WITHOUT CAREFUL PLANNING THE GRADES HERE WOULD HAVE BEEN TOO STEEP TO ENCOURAGE BUILDING DEVELOPMENTS

since been corrected as far as possible, although it was impossible to make a complete new layout owing to the fact that dwellings had been built along many of these steep streets. Highland Avenue was laid out following approximately the contour of Red Mountain at the foot of the steeper slopes. This avenue is approximately three miles long and 100 feet wide. As constructed, there are sidewalks 15 feet wide on either side, two driveways each 20 feet wide, and a grass plot 30 feet wide along the center, a double track trolley line occupying the center strip. This avenue is very crooked; however, the curves being light it affords very pleasant driving.

Several reservations were made for small parks or sunken gardens along this highway, which are really the heads of small hollows, and, as treated, present a very pleasing effect. Owing to the fact that there were large areas on the slope of the mountain, owned by the land company, in which very few sales had been made, and also a number of areas which were not owned by the land company, although partially surrounded by its holdings, it was possible, by the purchase of small holdings and the coöperation of large holders, to make a new layout of much of the territory.

Consequently very pleasing results have been obtained along the slope of Red Mountain and its foot hills. Only recently a survey embracing some 200 acres on the slope of Red Mountain has been vacated and laid out so as to conform more closely to the contours of the ground. Then again, some years ago the State Legislature passed a law requiring all land plots and subdivisions to be submitted to the city for its approval before being placed on record. This, together with the hearty coöperation of the larger land owners has produced excellent results. When the town site was originally laid out there was an area lying in the northeastern portion of the original town site through which the checker-board system of streets and avenues was extended. The streets and avenues each were 80 feet wide, the blocks were 400 by 500 feet, each block contained two 20-foot alleys running parallel respectively with the streets and avenues. This territory being very rolling in many places, the grades would have been practically impassable. Since there had been practically no sales in this area, the city and the land company entered into a new survey of the entire tract, the land company agreeing to submit its plans to the city and to devote as much area to street purposes in the new survey as was contained in the old. As a basis of the new layout, Norwood Boulevard was plotted 200 feet wide and approximately 1½ miles long, following as closely as possible the contours of the ridges. An 80-foot avenue which ran northeast and southwest along an extremely rugged location was entirely eliminated. The east and west alleys, as a rule, were also eliminated. The location of

the streets were changed, where necessary, to secure satisfactory grades. The lots were changed so as to front on the streets instead of the avenues as originally planned. This arrangement, of course, gave less depth to the lots; but since after the change their depths are approximately 190 feet, the arrangement has proven satisfactory. As a general result, the city obtained several acres more street area and the company something like 10,000 feet of additional frontage as compared with the original layout. Norwood Boulevard was improved by constructing sidewalks 15 feet wide on each side, and adjacent to the sidewalks driveways 20 feet wide were paved with bituminous material. This left a neutral strip 130 feet wide, which is used for playgrounds and park area. This arrangement of the driveways permitted their construction on entirely different elevations where the elevation of the adjacent territory rendered such construction advisable. Although the construction was not completed until 1913, there are very few vacant lots in this territory at the present time, whilst prior to the change of layout there was practically no demand for this property.

JULIAN KENDRICK,
City Engineer.

Finance Departments

Helping the Tax Collector

BALTIMORE, MD.—The Baltimore Municipal Journal has published the following calendar prepared by the Tax Department. It is intended to inform the taxpayers as to the city's tax requirements from the beginning to the end of the year:

January 1—State and City taxes are receivable, or as soon thereafter as practicable.

State tax rate is imposed biennially by the Legislature.

February—Greatest discount period.

May 31—Last day for discount on taxes due the Mayor and City Council. No discount is allowed on taxes due the State of Maryland.

July 1—Interest begins on City taxes.

September 1—Interest begins on State taxes. Chap. 261, Sec. 48, Acts 1918.

Last day to file application with Appeal Tax Court for reduction of real estate assessments.

Last day to file application with Appeal Tax Court for reduction of personal tax assessments.

September 15—All departmental estimates for the following calendar year must be submitted to the Board of Estimates. The Board then resolves itself into a Budget Committee. These departmental estimates are carefully gone over at public meetings and the amount necessary to run the City is ascertained. Having deducted the estimated receipts from all sources, other than taxes at the full City rate, from the total of the amounts allowed the departments, boards, etc., there remains a sum to be raised. This balance must be raised at the full City rate. Knowing the exact assessable basis chargeable with the greatest rate, by application of the simple multiplication table is found the rate necessary to produce the amount required.

December—Tax rolls delivered to City Collector when completed. Bills typed, verified and filed. Tangible and intangible advices calculated and mailed the day before the opening of Tax Collector's books for general collection.

Tax Rates—Full rate for 1920 is $2.97 per $100. Suburban is two-thirds of full rate.

Rural is one-third of full rate, but not less than 65 cents per $100.

New addition is 62 per cent (1920) of the full rate, increasing 2 per cent each year until the rate equals the full City rate.

Helpful Hints—Our floor space and manpower is limited, so exercise patience, as everybody cannot be waited on at the same time. You are but one in thousands of taxpayers.

Do not delay sending written requests for information.

Do not hold back checks in payment of taxes until last day of the month.

Address all communications to AUGUSTUS M. DENHARD, City Collector, City Hall.

It is believed that such an announcement published in the municipal journal, if the city has one, or in the daily papers, once a year or oftener, will do much to encourage the prompt payment of taxes and in other ways to facilitate the work of the collector.

AUGUSTUS M. DENHARD,
City Collector.

Pittsburgh Will Get More Use from its Parks

The Pittsburgh Chamber of Commerce has recently adopted a resolution in favor of a more liberal policy of Sunday amusements in that city. The resolution proposes the opening of parks and playgrounds on Sunday afternoons for amateur athletic games and sports, free movies of an educational and uplifting character in school buildings, with open forums and community singing. The resolution further recommends increased appropriations by the City Council and Board of Education to promote the more effective use of existing facilities in parks, playgrounds, schools and public halls.

Sewage Solids: Their Disposal and Value

By John R. Downes
Superintendent, Sewage Disposal Works, Bound Brook, N. J.

THE great problem in sewage disposal to-day is sludge disposal. It is comparatively easy to dispose of the liquid portions of sewage with very little or no odor. Any degree of purification consistent with local demands may be obtained, the degree of purification being simply a matter of costs which are not necessarily excessive. The solids, however, are a volume of material too small as a rule to justify the installation of extensive handling machinery, too large to be disposed of by a small well-trained force, and too distasteful to appeal to the casual labor of the day.

A recent report on an experimental method of sewage disposal dismissed the sludge question quite airily by stating that the amount of sludge produced by the system on the experimental scale was so small that what the neighbors did not take for their gardens was dumped into the stream. As a matter of fact, the sludge produced in this particular case was even greater than usual because chemical precipitation was used, and in any working scale plant the sludge would be a veritable incubus.

The above simply indicates how little the seriousness of sludge disposal is appreciated. As an aftermath of the extravagant claims formerly made for the septic tank, there still lingers the idea that preliminary tankage treatment produces some mysterious effect on the liquid portion of the sewage. The sooner it is realized that preliminary tank treatment of sewage is merely a treatment to separate the solids from the liquid, the sooner we can look for real progress in sewage disposal.

Separation of Solids and Liquids

Once the separation of the solids from the liquid is made, the further treatment divides itself into two parts—treatment of the liquid, and treatment of the solids. It is with the treatment of the solids that this article deals.

A portion of the solids are sometimes, as at the Bound Brook plant, separated by means of a mechanical screen, and in this case, as a usual thing, the solids are disposed of directly without further treatment. Where the solids are separated in tanks by sedimentation, it is the custom to attempt to reduce the volume of material to be handled by further treatment. Usually this treatment is biological and consists merely of storage for a sufficient length of time under favorable conditions.

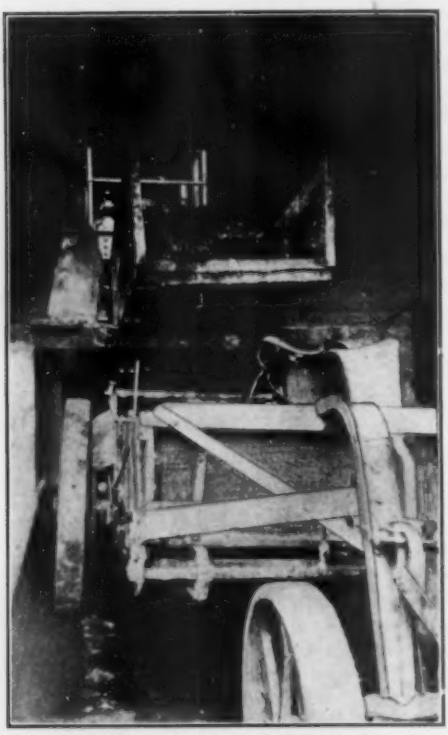
The material spoken of as sludge in this article refers to solids digested in a two-story tank and air-dried on stone beds, unless otherwise stated. The solids removed by the screen are referred to as screenings.

In an installation of a mechanical screen capable of handling about four million gallons of sewage daily, ample provision was made for carrying the liquids passing through the screen onward to the next step in the process. The mechanical work of the screen had been given such attention that the whole mechanism could be moved by the touch of a finger, and the power consumption for regular operation was only 2/3-horse-power. With this the screen concern feels that it has fulfilled its duty and leaves the disposition of the solids unprovided for.

It was in working out a solution of this problem of disposing of the solids from a mechanical screen that we hit upon the idea which has proved so valuable in the handling of sludge from the two-story tanks at the Bound Brook plant.

Disposing of the Screenings

The cans provided to catch the screenings were so large that one man could barely move them about empty, and the weight of the contents would be about 650 pounds. With no lifting devices at hand, we promptly dismissed the cans from consideration, and, pending the development of some better plan, allowed the solids to fall to the concrete floor, from which they were hand-shoveled into a one-horse dump-cart. The next step was to provide a dump-cart specially designed to fit under the discharge spout of the screen and catch the screenings direct. This facilitated matters at the loading end, but spreading the screenings in the field after they had been dumped from the wagon proved to be even more arduous and unpleasant than the loading at



THE SPREADER IN PLACE BENEATH THE TIP BODY READY TO RECEIVE A LOAD OF SCREENINGS

the screen. The screenings, if left in heaps, produced considerable odor in a short time, and the only way to dispose of them without odor was to have them spread out in a thin layer as soon as possible and plow them under the surface just far enough to assure that they were well covered.

In seeking for a mechanical spreading device, we decided to try a manure spreader such as is used on any up-to-date farm. The spreader proved to be a great success, but it is a job for a husky three-horse team to operate such a machine continuously. On consideration, however, it was determined that it cost more to keep even a two-horse team than to operate a tractor.

After investigating about 150 makes of tractors, we chose for our work one of the endless-track or caterpillar type. While these cost more to purchase and the upkeep is somewhat higher than on a wheel type machine, we felt justified in our choice because we had to have something that could work every day in the year regardless of weather or ground conditions, also something that would not tear up our stone roads to and from the field.

The machine spreading was far superior to hand work. In hand spreading the solids fall in big clumps which are very hard to cover with a plow. The machine spreads the material in a shower of fine particles, and with our special high-speed attachment makes a very uniform coating about ½-inch in thickness. This coating is easily turned under without leaving a trace on the surface. When the plow has gone over the field there is no evidence of sewage and only the faint odor of newly turned earth so familiar in any newly plowed field.

Observing the success of this system of disposing of the screenings, the same system was applied to the dried sludge. This proved equally successful. The sludge is still loaded by hand, as a satisfactory loading device has not yet been designed.

The screenings drop from the screen chute to a wooden platform, from which they are thrown back occasionally by hand into a tip body balanced on a beam, beneath which is a concrete inclined runway to receive the manure spreader. When the tip body, which holds the same quantity as the spreader—2 cubic yards—is filled, the trigger is removed, the body tipped, and the sliding body of solids gathers impetus and strikes the inside of the front end board of the spreader with an impact sufficient to move the spreader ahead in its runway so that the whole body of solids slips easily into the body of the spreader, filling it completely and evenly.

The production of sludge at the local plant in three years, during which the population served increased from 22,000 to 35,000, was 9,222 cubic yards as it came from the digestion tanks with 5 to 6 per cent solids. This volume was reduced by drying to 2,393 cubic yards as put onto the fields, with 25 per cent solids.

This 25 per cent sludge is rather more wet than is convenient to handle, but to dry it further requires a time factor out of all proportion to the results obtained, especially where one is pressed for drying space, as is the case locally.

A 1,000-gallon tank cart provided with wide wheels has been found very convenient with the tractor. Such a tank eliminates waiting for sludge beds to dry, and while the volume of material is, as shown, four

times as great as that of dried sludge, all manual labor in handling the sludge can be eliminated, and the cost is actually less than for handling dry sludge.

To dispose of 2,393 cubic yards of sludge by one horse cart and hand spreading:

1,874 man hours.....	@ .50	$937.00	
1,874 horse hours.....	@ .25	468.50	
			$1,405.50

To dispose of same by manure spreader hauled by a tractor:

1,595 man hours.....	@ .50	$797.50	
1,296 tractor working hours	@ .45	583.20	
			$1,385.70

To dispose of 9,222 cubic yards of undried sludge drawn direct to tank cart:

1,352 man hours.....	@ .50	$676.00	
1,106 tractor operating hours	@ .45	497.70	
			$1,173.70

Having plowed the solids under the ground without nuisance, we congratulated ourselves that we were well rid of them, but the appearance of acres and acres of weeds made the fields look as disreputable as a suburban real estate development, although shrubbery had been planted about the drives and corners to give the effect of a park.

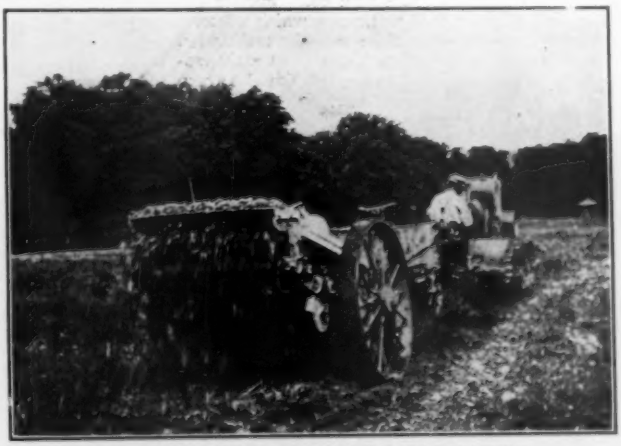
Raising Crops on Sludge

It became evident, then, that the work was not finished and that the ultimate disposal of sludge required the cultivation of the fields. For esthetic reasons, if for no other, trucking crops were not considered suitable to our purpose. The grains all do well on this fertilizer, and which grain to raise depends upon the time of year when the field is ready for the cropping treatment. Fall grains gain enough headway in the early spring to get ahead of the weeds; corn is an excellent crop to raise on fields ready up to the first of June, if the cultivation is very thorough. Extra work in this line is required, however, for success. Oats are outgrown by weeds unless they can be gotten in very early.

In order to determine the actual fertilizer value of sludge,—a question which has long been under discussion with no very satisfactory conclusions,—a piece of land was selected 7¾ acres in area, which had been stripped in a grading operation and on which experiment had proved that no vegetation could subsist. The soil was sand and gravel with a little shale. By growing oats on this field one year, and corn the next, two average growing seasons were covered under practical working conditions, yet with the assurance that all vegetable growth which we might obtain came entirely from the sludge. The writer did not set out to prove anything pro or con, but simply to ascertain the truth for his own information. The opportunity seemed too good to be lost as all the artificial conditions of the usual growing tests were eliminated.

Under the conditions described above for the two years, a total of 43 tons of sludge per acre produced 42 bushel of oats and 50 bushel of corn. The labor regularly employed about the disposal plant was used for this farming operation, and a careful account of the time was kept.

Applying the prevailing wage rate and quotations on grain for the same day in January, 1920, the crops would be worth $95.90, and to produce them would cost $51.80, leaving a yield value of the sludge equal to $44.10, or $1.02 per ton delivered and spread in the field. Delivering and spreading the sludge, including up-keep of machinery, cost at the center of the disposal area, $0.45. The net yield of a ton of sludge, then, is $0.57.



SPREADING THE SCREENINGS ON THE FIELD

The solids can be plainly seen showering from the tail of the spreader. Their velocity may be judged by their blurred appearance in this snapshot.

Some minor experiments were carried on two years ago to determine the proper thickness of the sludge coating. The following year this experimental area was worked in with a much larger adjoining field, the whole being coated with barn yard manure and a cultivated crop raised. This year the combined areas were planted in oats without any additional fertilizer, and there is a distinct dark patch of extra luxuriant growth over the area which had received sludge two years ago, showing a stamina, or hang-over value, with which sludge has not been generally credited. This would add to the $0.57 per ton value shown above.

A further experiment was made by comparing sludge and green stable manure in strips in a field of corn. No difference was evident, although the comparison was carried to the extent of comparing the number and size of the ears growing on the two fertilizers.

This experience would suggest that the cash value of sludge in any given locality would be equal to the cash value of stable manure, but the market for the former is limited by an aversion to it on esthetic grounds as well as because of the number of weeds which it produces, making the area unsightly.

Jamestown Establishes Municipal Milk Plant

August 24, 1920.

To the Editor THE AMERICAN CITY,
New York City.

Dear Sir:

The taxpayers of the City of Jamestown by a large majority vote decided at an election held August 21, 1920, to establish a municipal milk plant and sanitary distribution system in the City of Jamestown, and a proposition to issue bonds to the amount of $150,000 was authorized, and the creation of a Commission to be appointed by the Mayor, consisting of four members to carry out the scheme of municipalization of the milk supply.

This proposition was submitted to the taxpayers, a year ago, and was defeated by an overwhelming vote. The favorable decision at the recent election showed a complete reversal of public sentiment and a pronounced vote in its favor. The plan contemplates the erection of a central station to which all milk from the producer will be brought and tested in a scientific manner, each can from each producer being subjected to an individual test so as to safeguard against bacteria and impure milk. The producer will be paid on the basis of the quality of milk supplied; those having the lowest bacteria count and highest percentage of butter fat will receive the highest price for milk. The milk will be clarified and all milk, except Grade "A" raw milk, which comes from tuberculine tested cows, will be pasteurized, and all milk will be placed in bottles under the improved method of bottling, under which the milk is free from the touch of human hands or any contamination. The milk will be delivered at an early hour to each householder. The city will be divided into 30 districts, one delivery man for each district, these will take the place of the 70 milk peddlers who are now supplying the city with milk, and who are crossing each other's tracks continually and thereby entailing a duplicate expense and waste of effort, which is now borne by the community. The municipal system will eliminate the added cost of the present middleman's profit.

The price of milk at the present time in the City of Jamestown is 15 cents per quart for Grade "B" milk. Under municipal operation, it is believed that the milk can be sold at a considerable lower price, and that the consumer will get an improved quality of milk with a full cream content, which is not now the case and that the farmer will receive a higher price for his product than he now receives.

The 40,000 people of the City of Jamestown pay out annually, under prevailing prices, more than one million dollars for milk. This is 60 per cent more than the entire municipal tax budget for all city purposes.

But the innovation by which it is proposed to eliminate the element of exploitation of the milk supply in the City of Jamestown and make the supply a matter of public service is favored more as a health than an economic measure, because under the present system a germ-laden bottle of milk delivered to the back door of a home often means a crape on the front door.

By-products which are often of considerable amount in a central plant will be utilized by the city for the manufacture of cheese, butter and buttermilk.

The proposition to municipalize the milk supply is not a socialistic measure, but a common sense, businesslike method by which the citizens unite in the employment of the agency of the city government to do in an economical and sanitary manner that which a superfluous number of peddlers are unable to do under competitive conditions for private gain.

The foremost sanitarians and health authorities of America have endorsed the Jamestown plan of handling the milk supply as the only solution to the milk problems.

Very truly yours,
SAMUEL A. CARLSON,
Mayor.

Negligence Claims Against Municipality

Formal Notice Necessary Precedent to Action

By Arthur L. H. Street

BY special statutory provisions the municipality is favored in most, if not all, of the states, over the ordinary defendant in an action for injury to person or property. It is now very commonly required by state law or charter provision that no suit shall be maintained against a city on account of injury caused by negligence, etc., unless some such formality as filing notice of the claim is first gone through. But excepting as requirements of this kind are expressly made, suit may be brought against a municipal corporation without previous notice, the same as it may be brought against a private corporation or an individual.

The requirements under this head have not been standardized. Resort must be had to the particular charter or code governing a municipality. Yet there are very numerous appellate court decisions which have served to crystalize legal principles of general application. For instance, it is generally held that "such charter or statutory provisions, so far as the requirement of a notice or presentment as a condition precedent is concerned, are in derogation of common right, and should be strictly construed, and cannot be extended by implication beyond their own terms, and therefore will not require such notice with respect to damages which are not within the intention of the statute; but where a notice or presentation has been given or is made, its sufficiency under the statute is a remedial matter, and it should be liberally construed. Such provisions are generally declared not to be retroactive." (28 Cyc. 1450.)

That a legislature may constitutionally require giving of notice or presentment of claim before suit may be filed has become a proposition well settled by a long line of appellate court decisions handed down in states including New York, Wisconsin, Alabama, Texas, Indiana, Illinois, Michigan, Washington, Tennessee and Utah. But, as declared by the Washington Supreme Court, in the case of Hase vs. Seattle, 51 Wash. 174, 98 Pac. 370, 20 L. R. A. N. S. 938, the requirement must be reasonable in its terms, and is merely to be regarded as affording the municipality fair opportunity to prepare for trial if it is deemed inexpedient to settle the particular claim. In the cited case it was decided that requirement that claimant state his place of residence during the past year was invalid.

It has been frequently decided by courts of last resort that a notice or statement of claim need not *strictly* comply with the statutory requirements; it is sufficient that there is a *substantial* compliance.

Ordinarily, the vital elements of the notice or statement of claim are time, place and cause of the particular accident, and the nature of injury resulting.

As to time, the Connecticut Supreme Court of Errors seems to reflect the general judicial view by holding that the notice or statement must be so specific as to enable the municipality's representatives to inquire into the facts surrounding the claim. (Shaw vs. Waterbury, 46 Conn. 263.) In the latter case of Gardner vs. New London, 63 Conn. 267, 28 Atl. 42, the same court decided that a notice of claim was vitiated by a variance of three days between the time of an accident as stated in the notice and as actually found to be the fact. But there are several decisions to support the just proposition that "a slight variation in time will not render the notice so defective as to defeat the action." (28 Cyc. 1457.)

For example, a New York court decided that the fact that a notice stated that an accident occurred on the 5th of the month did not preclude claimant from recovering on proof of an accident occurring on the evening of the preceding day. It is conceivable that a notice might be fatally defective for failing to state the particular time of day when an accident occurred.

The author of the article in Cyc. on Municipal Corporations, and the annotators of that article in bringing it down to date, set forth numerous illustrations of notices which have been held to have been sufficient or insufficient in the matter of stating the *place* where an injury

complained of occurred. Notices upheld include the following designation of places: where a sewer crossed a named street between F and H Streets (Denver vs. Barron, 6 Colo. App. 72, 39 Pac. 989); "A hole in the sidewalk situated between Hotel Cleaves and Dunbar Brothers' store upon town way in said town of Sullivan" (Hutchings vs. Sullivan, 90 Me. 131, 37 Atl. 883); a notice specifically describing a defect at the corner of two ways, but not indicating which of the four corners (Sargent vs. Lynn, 138 Mass. 590); on the certain side of a named street between two other specified streets (Lincoln vs. Mays, 2 Nebr. 204, 96 N. W. 484); on a certain street opposite a well-known hotel (Dallas vs. Myers, 64 S. W. 683). Cases in which it has been decided that notices insufficiently indicated the place of accident include Gardner vs. Weymouth, 155 Mass. 595, holding that a statement that an accident occurred on a sidewalk where there was a hydrant was fatally defective.

Inconsistent descriptions in notices will not vitiate them if the place can be located with reasonable certainty; for example, where the place is indicated as being in front of a certain street number and premises occupied by a certain person, on the *west* side of the street, when, in fact, the place, as indicated by the occupant's name and the number, is on the *east* side (Cloughessey vs. Waterbury, 51 Conn. 405); or where a landmark was mentioned as being 847 feet south of another point, whereas it was 860 feet south. (Davis vs. Rumney, 67 N. H. 591, 38 Atl. 18.) But a New York court holds that a misleading mistake as to house number invalidates the notice.

The nature of the defect or the condition complained of must be designated with reasonable certainty. So the Minnesota Supreme Court in Olcott vs. City of St. Paul, 91 Minn. 207, decided that notice of a claim for injury sustained by falling on an icy sidewalk would not support an action for damages based on falling into a dangerous hole caused by decay of the sidewalk. The Court said:

"The manifest object of such notice was to enable the municipality, by its governing body, promptly to investigate . . . the time, place and circumstances of the injury, while witnesses were obtainable and facts fresh in their recollection. . . . While we are not inclined to be technical in the construction of notices required under this provision of the charter, and should construe it with reasonable liberality, yet we cannot adopt a view that would dispense with the substantial objects required thereby. We are bound to assume that the distinctive ground for recovery is the defective and rotten condition of the walk, whereby a dangerous hole was permitted to remain therein; and the notice, which directs attention to another claim, might be misleading, and, if treated as sufficient, would require the city officials who were to make the investigation of its condition to act upon any reference to the place of the injury, and necessitate a discovery upon such examination of any cause which might produce the same."

And in the case of Gagan vs. Janesville, 82 N. W. 558, the Wisconsin Supreme Court decided that notice that a pedestrian was injured through stepping into a "hole" in a sidewalk could not be supported by suit for damages sustained through a loose board's turning and causing his foot to slip into the opening created thereby. But any description which reasonably apprises the city as to the defect or wrong complained of is sufficient; for example, a statement that an accident was due to lack of a railing to protect an embankment (Grogan vs. Worcester, 140 Mass. 215, 4 N. E. 808), or to icy and slippery condition of a sidewalk at a specified place (Spellman vs. Chicopee, 131 Mass. 343).

There are numerous decisions on the question of the sufficiency of specification of the nature of injuries sustained by claimant. This point is governed by the same general test applying to the other elements of the notice—sufficiency to reasonably apprise the city as to the nature of the claim against it. But there can be no recovery for injuries known at the time of filing the notice but not covered by it.

"A failure to give the notice or present the claim in the time and manner prescribed by statute is a bar to the action, and such failure is not excused by the mere fact that the city council or other officers of the municipality had knowledge of the circumstances of the injury, nor by the fact that the person injured had no suspicion or knowledge of the injuries until after the time for giving the notice had expired. Mental and physical incapacity, however, caused by the accident, of such a character as to make it impossible to give the prescribed notice, is ordinarily a sufficient excuse for failing to give the notice within the time prescribed. But disability during a portion of the period allowed will not extend the time of performance provided a reasonable time remains within the period after the disability is removed." (28 Cyc. 1461.)

The Relation of Water to Forestry

By Thorndike Saville

Associate Professor of Hydraulic and Sanitary Engineering, University of North Carolina

THE three great elements in a national program for conservation of natural resources are those pertaining to water, forests, and minerals. Conservation of our mineral resources consists in a restricted use, since they are non-renewable and of limited extent. Conservation of our water and forest resources, on the other hand, consists in the greatest possible use commensurate with economic demands and proper provision for their replenishment. It is these latter resources which this paper considers. They are susceptible of constant renewal and perpetual use under scientific policies of management, but when exploited for immediate profit for the sake of expediency and with no regard to the public welfare, are as evanescent as the less permanent mineral resources.

The relation of water resources to forestry is complex. The subject may be considered from three standpoints: first, the effect of forests upon the occurrence and distribution of water, or the hydrological relation; second, the effect of forests upon public health and scenery from their presence on municipal watersheds and reclaimed swamps, or the public welfare relation; and third, the effect of forests upon water-power, navigation, agriculture, etc., or the economic relation.

Hydrological Relation

A considerable literature has grown up in the past ten years relating to the effect of forests upon the magnitude and frequency of floods. Eminent scientists and engineers have violently espoused each side of the controversy. Proponents of forestry measures have made startling claims for the favorable influence of forests in mitigating the evil effects of floods. Some engineers have made equally inclusive statements as to the entire absence of any beneficial effects of forests upon flood control. As a result, due to the emotional appeal of the forestry advocates, the general public has an exaggerated idea of the benefits of forests upon flood mitigation, and scientists are bewildered by the conflicting statistics of engineers.

Out of all of this mass of contradictory evidence a few general principles may be regarded as well established. In mountainous districts, where the streams are bordered by steeply sloping hills the forest cover serves to reduce both the frequency and magnitude of the average flood, and consequently is highly beneficial. After protracted rainfall, when the cover has become saturated, this effect is absent. Therefore the maximum floods, even in mountainous regions, are little affected by the presence of forests. The relative beneficial effect of forest cover decreases with increase in size of the mountain stream. On very large rivers draining a rolling or flat country, the presence of forests does not seem to affect the magnitude or frequency of floods to any appreciable extent.

Like the preceding, the regulation of run-off has long been a moot question, and, as above, the beneficial effect of a forest cover is most evident upon the run-off of streams draining a mountainous territory. The forest roots and humus undoubtedly retain much water from rain-storms, and deliver some part of it later to the streams, thus conserving what might otherwise go to waste on flood flows. Moreover, the shading effected by trees serves to retard the melting of snow and the evaporation from the land surface. On the other hand, the evaporation and transpiration from the leaves is great, especially when covered with snow. The consumption of water by plant growth is, however, less for trees than for any other kind of vegetation. Conifers are the best trees from nearly all standpoints of water conservation. As before, these conditions are most favorable for regulating stream flow in regions of steep gradient where the water from average rains seeps rapidly into and through the humus and is fairly quickly delivered to the stream. The discharge is thereby rendered more constant. In regions of flat gradient the presence of forest cover may be disadvantageous in that seepage is less rapidly removed, increasing the amount of water evaporated by vegetation or used in plant growth, and reducing the discharge of the streams.

EROSION GULLIES ON DEFORESTED SLOPE NEW MEXICO
Gullies are now 10 to 25 feet wide and 6 to 15 feet deep having developed in 2 to 4 years

Erosion and Silting

Removal of forests inevitably causes extensive gullying of the slopes, with consequent transportation of the eroded material to the streams. The result, from a hydrological standpoint, is two-fold. First, the regimen of the streams is disturbed. They must carry a load of detritus beyond the capacity attendant upon their normal gradient. This means deposition, building up of the stream bed, alteration of the course of the stream, and transportation of debris to points below, where navigation and flow in a larger stream may be adversely affected. Second, the detritus washed from the deforested land is transported by the streams and deposited in any reservoirs created for water-supply, water-power, or irrigation purposes. Forestry enthusiasts have stressed the importance of forests in the regulation of flood flows and run-off. The effect of deforestation in causing erosion and silting is probably more important and of more far-reaching consequence. The beneficial effects of forests upon these is very considerable.

Protection of Public Water-Supplies

The protection of impounded public water-supplies from all possible sources of pollution demands ordinarily a minimum use of the watershed for domestic or agricultural purposes. The best kind of watershed, from a hygienic standpoint, is one thickly wooded. Cities are rapidly coming to pursue a definite policy of forestation upon their watersheds used for domestic water-supply. This policy is carried out from the double relation of health and economy. The economic aspects of the question are discussed later. Closely related to the forestation of watersheds is the protection of reservoirs from dust, and the effect of decreased evaporation due to adjoining woods.

Within recent years the drainage of swamps as an anti-malaria measure has been carried out on a constantly increasing scale. The results may be three-fold; first, the elimination of malaria; second, the reclamation of valuable agricultural or building land; and third, the conversion of vast tracts of useless land into ground suitable for forestation.

The creation of parks and open spaces where people living in congested districts may get good fresh air and a chance for out-of-door recreation has become a well-established adjunct of any municipal or state public welfare program. There has been a pronounced tendency of late years on the part of cities to make beauty spots of their water-supply areas. The reservoirs near the city are equipped with attractive buildings, and shade trees to serve as open spaces and recreational centers. The larger areas on the watershed are laid out with walks and drives, experts in landscape architecture and forestry are retained to formulate a policy, and the district is made attractive to automobilists and excursionists from the city. The thoughtful planning of the environs of municipal watersheds was begun by the Metropolitan Water Board in Boston under the direction of the late Frederick P. Stearns. Here miles upon miles of beautiful drives lead the automobilist about the secluded reservoirs and lakes; while the tramper, picnicker, or Boy Scout finds countless paths leading through the wilder portions of the reservation. The whole project is under the guidance of an expert forester and landscape architect. This plan so successfully pursued in Boston has been followed by Hartford, Conn., New York, Asheville, N.

C., and other cities in the prosecution of extensive additions to their water-supply areas. The drives and forests about the watershed are annually attracting thousands of visitors.

Conservation of Water and Forest Resources

The conservation of water resources is effected by the greatest economic use, and is two-fold. The waters not utilized, and which would otherwise be wasted, are set to productive use; and thereby (in the case of water-power) a corresponding saving is effected in on-renewable energy sources, such as coal or oil. With increased cost of fuel, and difficulty in transporting it to inland points, the development of water-power projects has been tremendously stimulated during the past few years.

At present the demand for electric power is far beyond the supply in many parts of the country. Public utility corporations have hesitated to enlarge their plants for two reasons—first, the difficulty in obtaining labor and materials and the high prices for these, and second, the reluctance of public service commissions to allow increase in rates to cover increased cost of new development. This attitude has made it difficult for corporations to obtain money for new improvements. Where water power-sites existed upon navigable streams the policy of the National Government has not been such as to make private power developments practicable. This is now remedied by the recent enactment of the Water-Power Bill, which will tremendously stimulate developments in some parts of the country.

In some of the eastern states the larger water-powers have nearly all been developed. There still remains a vast amount of power in the smaller falls and streams, which individually may not be economically developed. It is now possible, through the utilization of the induction generator, to develop a number of such streams, interconnect them, and tie them into a larger controlling system. They will then feed into the system a variable amount of power, depending upon the season. The development of district water-power schemes of this sort, which in part at least may be automatically controlled, is one of the most hopeful means of increasing electric-power output in manufacturing regions. Several installations are already in operation. Newer developments will probably follow some such scheme as is outlined in the Super-Power project for a great trunk-line system from Boston to Washington, an investigation for which is provided in the last Sundry Civil Appropriation Bill.

Like water-power, the conservation of forest resources is effected by maximum judicious use. The principles of selective cutting and reforestation are too well known to need discussion here. Just as water-power has become finally recognized as a national asset needing federal control, so should general regulations of state and nation control the promiscuous destruction of our forests. A double conservation is possible here also, through electrification of the steam railways. Thousands of acres of valuable forest land are annually destroyed through fire caused by sparks from locomotives. The electrification of the railways in forest regions thus not only effects econ-

WATER WHEEL RUN BY A SMALL STREAM KEPT ALIVE BY FOREST COVER ON AN ADJACENT HILLSIDE, NORTH CAROLINA

omy in fuel conservation and operating expenses, but also in preventing the waste incident to forest fires.

The hydrological effect of erosion and silting caused by deforestation has already been discussed. Next to the destruction of the timber itself, probably the gravest economic loss arising from removal of the forests is in the silting of navigable streams and the destruction of valuable bottom lands. Instances are not uncommon where navigable streams which a score of years ago required little maintenance of channel now need constant dredging to remove the deposits brought by floods from the denuded mountain sides. This effect is felt far distant from the source of the trouble, and the material eroded from mountains by torrential streams may eventually cause deposits on a large navigable stream hundreds of miles away. Once the damage is done, reforestation and flood-control works are the only palliatives of the cause. Both have been extensively practiced by the French in the Alps, at great expense. A sound forest policy will eliminate the necessity for such regulatory works.

Some of the most valuable and productive land in upland regions lies in the valleys of the streams. As deforestation proceeds, with consequent erosion, the stream sides are aggraded by the transported detritus. In consequence, at times of flood the water overflows the banks, causing washouts, gullying and destroying the fertile valley bottoms. The remedies and preventives are the same as those described in the preceding paragraph.

Employment of Construction Labor in Winter

The beneficial effects of forests upon watersheds used for domestic water-supply has been mentioned previously. An important corollary of this is the opportunity which municipal and state forests give for the employment of construction labor during the winter months. The present scarcity of skilled labor makes it imperative that laborers experienced in water-works, sewer or road construction be retained throughout the year. If they can be utilized in forestry work on the watersheds during the winter months, they will not be a dead load on the pay-roll. The cities of Hartford and New Haven, Conn.; Boston, Mass., and Nashua, N. H., have practiced this combination of forestry and labor conservation with great success. Even if value of the wood cut will not show a profit, a careful policy will make expenses meet, and serve to hold skilled labor. After a decade or more of such procedure, there may be some actual profit from the forestry operations, as the labor becomes more skilled in lumbering and the value of the timber available for cutting increases.

National Forests and Water Resources

Since 1901, the Secretary of Agriculture has been empowered to issue permits for "the occupancy and use of National Forest lands for the construction, maintenance and operation thereon of project works for the development, transmission and use of power." The policy of the Department has always been to encourage the development of water-power projects on National Forests, but in spite of the fact that many excellent sites exist, relatively few projects have been undertaken. This has been due largely to the provisions of the act which allows the Secretary to revoke a contract at will; to impose new rental rates after a lapse of ten years; to treat appreciation of land as income for rate making, and to other broad-powers of the Federal Government. Such regulations have made investments by private capital unattractive.

The Water-Power Bill (H. R. 3134) which has just become law makes definite provision for the development of sites on the National Forests, and eliminates many of the disadvantages enumerated above. A Federal Power Commission, consisting of the Secretaries of War, Interior and Agriculture, is appointed, which has very broad powers regarding all use of the waters subject to regulation by the United States. Licenses will be issued for a period of fifty years, and are revocable only after civil procedure in the federal courts. The passage of this bill will, undoubtedly, stimulate greatly the development of water-power projects on the public domain.

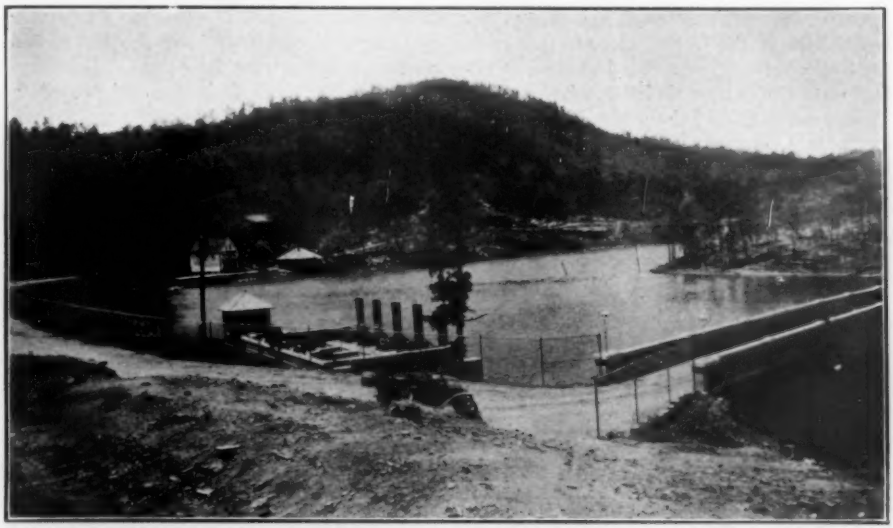
State and Municipal Forestry and Water Resources

Where power shortage exists, and power companies are unwilling or unable to extend their plants, the question of municipal and state enterprises becomes important. Adequate power is so essential to the development of any territory that a municipality or

state can afford to expend large sums in water-power developments with a much less return the investment than a private company, since the difference is the intangible return from the possession of power which attracts industry to the city or state. The development having been made, the operation of it to supply power is most economically made by long-term lease to a public utility company.

The enactment of the national Water-Power Bill is of vital concern to all states, since the powers of the National Government under the terms of this bill are so sweeping as to seriously affect state control of its water-power resources unless certain provisions are made. It especially behooves states or municipalities containing National Forests or the headwaters of navigable streams within their boundaries to act quickly to preserve to themselves the administration and control of water-powers situated therein. The Power Commission is authorized to issue licenses for and administer the operation of water-power developments on the "navigable waters of the United States, or upon any part of the public lands and reservations" (including National Forests), and to direct the "construction, maintenance and operation of headwaters or other improvements of streams upon which the Commission is authorized to issue licenses." This means that a farmer desiring to erect a 150-horse-power mill on a small stream tributary to a navigable river must have a federal permit, or find his enterprise stopped or modified by federal regulations.

The act further provides that applicants for federal licenses must have "complied with the requirements of the laws of the state or states within which the proposed project is to be located, with respect to bed and banks and to the appropriation, diversion, and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting and distributing power".....and that nothing within the act "shall be construed as affecting or intending to affect or in any way to interfere with the laws of the respective states relating to the control, appropriation, use, or distribution of water used in irrigation or for municipal or other uses, or any vested right contained therein." For states not provided with laws relating to water use or water-power the act provides "that in case of the development, transmission, or distribution, or use in public service of power by any license hereunder, or by its customer engaged in public service within a state which has not authorized or empowered a commission or other agency or agencies within said state to regulate and control the services to be rendered by such licensee or by its customer engaged in public service, or the rates and charges of payment there-



DAM AND RESERVOIR OF LARGE POWER COMPANY WITHIN A NATIONAL FOREST

for.....jurisdiction is hereby conferred upon the commission.....to exercise such regulation and control until such time as the state shall have provided a commission or authority for such regulation and control." Moreover, the bill specifically provides especially favorable terms for state or municipal developments on the National Forests.

Excellent as the provisions of the act are in furthering water-power development in the United States, it is evident that such states as do not have conservation commissions, a Geological Survey, or other agency authorized to investigate and regulate the use of the water-power in that state are likely to be at great disadvantage. Certain states have near their boundaries great water resources. If these are developed by extra-state corporations and the power transmitted to the adjoining state for industrial use, the owner state loses the utilization of a valuable natural resource. If a city is situated near a National Forest, a private manufacturer may use the water resources of the forest under federal license, and the municipality desiring to extend its power facilities or water-supply may have to go a great distance and be at great expense to provide what it should have available near at hand. It is evident that the provisions of the Water Power Bill are eminently fair and favorable to states and municipalities, but they must be provided with the administrative machinery to preserve and utilize their water resources. Several states, not so provided with water use laws or commissions for their enforcement have recently been stimulated to provide them by the passage of the Water Power Act. Those states or municipalities having water resources of magnitude will do well to immediately investigate their potentialities, enact laws regarding their use, and provide a commission to investigate and regulate the development of power projects, whether or not these come under the provisions of the Water Power Bill.

Acknowledgement:—An address before the North Carolina Forestry Association, Asheville, N. C., June 10, 1920. Photographs by courtesy of U. S. Forest Service.

The Country's Smallest Public Park

By Allen H. Wright

To the city of Visalia, Calif., is said to belong the honor of having the smallest public park in the country—if not in the world—which has been officially dedicated and named. It is called Askin Park, after a former mayor of the city, whose wife was appointed the official custodian.

The park is surrounded by a concrete curb. In its center stands a majestic oak tree, and to save this tree, at the time of grading Main Street, the plat of ground about its base was made a public park, as otherwise the tree, standing in the street, might have had to come down.

ASKIN PARK, VISALIA, CALIFORNIA

Blazing A New Trail Through the Wilderness

Road Building in Arkansas Opens New Country for Development

By Harold T. Macfarland

CHIEFLY instrumental in the present progress of Arkansas are the good roads which the state is building in almost every county. Sections not yet developed, sections virtually denied all opportunity for development in the past, now have the opportunity to advance with the rest of the nation, their residents in easy contact with other communities, their markets nearer, in point of transportation, by many hours and even days, their social life no longer restricted. Through the medium of modern highways being constructed at the expense of millions of dollars, vast agricultural areas are being opened up, great timber reserves are being made available to loggers and shippers.

Eighty-five hundred miles of good roads are planned by Arkansas, and many of them are already under way. Bond issues to finance the improvements have been authorized, and many of the bonds have been disposed of. Road building in parts of Arkansas differs mightily from the average construction in the East, or the Middle West. Among the most pretentious of the highway improvements in the state is the Arkansas-Louisiana Highway, a $3,500,000 project which now is nearing completion. Stretching for more than 153 miles through the extreme southeastern section, this road pierces the river-bottom or delta lands along the Mississippi, which are among the most fertile lands in the United States.

Pioneer railroad builders faced no more gigantic task than did the forces that have met successfully the obstacles in the construction of this highway. Through lands which lacked even a wagon road or path, parts of the highway were constructed with the aid of tree fellers, stump blasters and grubbers. Drainage problems were encountered on a stupendous scale, for in former years the whole of this delta land was under water for long periods each year. More than 40 per cent of the new highway was laid through districts where the chief soil was "gumbo" or "buckshot," a thick, black mud.

The Arkansas-Louisiana Highway starts

THIS BARBAROUS STRETCH OF ROAD WILL BE REPLACED BY A HARD-SURFACED HIGHWAY

at Grady, a small town a few miles north of McGehee. At McGehee the road splits into three parts: the one to the east leads to Arkansas City, the second swings into the hill country of Drew County, and the third follows the line of the Mississippi levees to the Louisiana state line, where, at Arkla, it terminates. It is the third branch that traverses the most fertile and the wildest section of Arkansas, and one of the truly wild districts of the United States.

On a 5-inch concrete foundation, scientifically drained, a 2-inch wearing surface of Bermudez asphalt has been laid. This form of construction extends for 113 miles. The rest of the highway is macadam built with broken trap rock or gravel. The paved highway is 13 feet in width, with 6-inch concrete headers on each side of the road. The road-bed generally is 22 feet wide, and the right of way varies from 40 to 75 feet.

Pile and frame bridges were employed in the construction, to be replaced later by more permanent structures. Miles of deep side ditches, and many drainage openings of reinforced concrete, are employed in the drainage scheme.

The first survey for this road was made in 1917. Construction work was commenced during the summer of 1918, and the road will be finished this year, according to present plans.

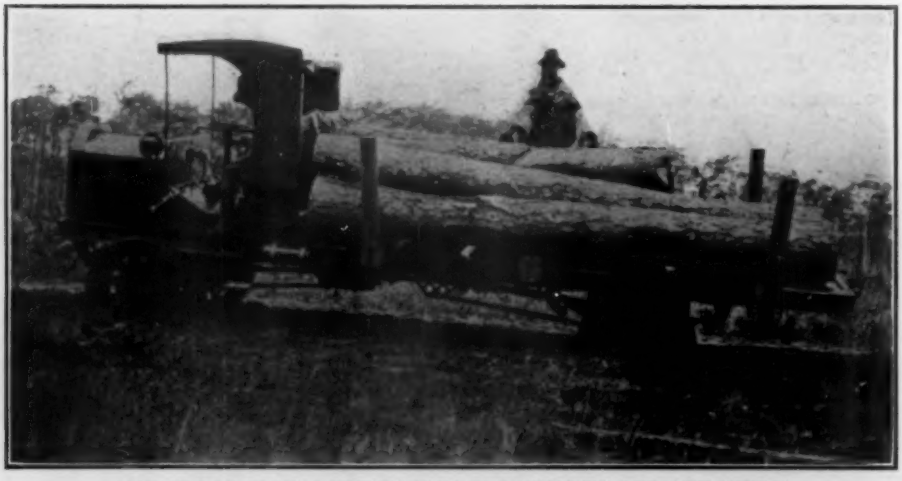
For this highway between cotton fields and through forests, past tumble-down shacks occupied by negroes and through more than two score tiny settlements, an immense amount of material was required. Three hundred and fifty-one acres of ground had to be cleared, and on 370 acres grubbing was necessary; 752,440 cubic yards of excavation work was performed. The following statistics will show the extent of the operation:

Concrete in culverts, cubic yards	5,800
Foundation excavation, cubic yards	10,200
Reinforced and I-beam steel, pounds	260,000
Concrete roadway header, lin. feet	594,350
2-inch asphaltic concrete surface, sq. yds.	850,500
5 inch concrete base, square yards	850,500
Piling, lin. feet	11,500
Timber, M. B. M.	160
Gravel macadam, square yards	234,800
Trap rock macadam, square yards	97,700
Trinidad Lake asphalt, tons	800

The engineers were Ford & MacCrea, of Little Rock. The Bryant Paving Company, of Waterloo, Iowa, and the White Construction Company, of Chicago, were the contractors. Mechanical mixers, industrial railways and other up-to-date equipment were employed with marked success on the highway.

The Arkansas-Louisiana Highway is designed to form a link in a series of highways extending from Little Rock to the Gulf. Louisiana is planning a highway which will traverse the state.

Truck Transportation Needs Good Roads

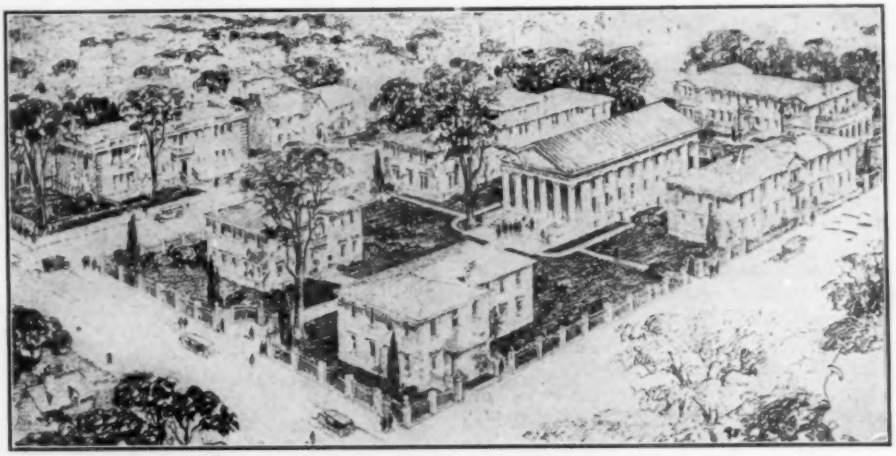


A HEAVY LOAD ON A MUDDY ROAD IS A PROBLEM FOR ANY TRUCK

An Ideal City Health Center

A Remarkable Group of Buildings Proposed for Norfolk, Va.

THE Public Health Department of Norfolk, Va., has made plans for the carrying out of health relief work in that city in a most progressive and ideal way. Many cities have established and are operating public health centers where all clinical, special welfare and health relief work can be unified, but no other city has carried out the project so extensively as Norfolk is planning to-day.



Litho print courtesy of Modern Hospital

PERSPECTIVE OF PROPOSED HEALTH CENTER FOR NORFOLK, VA.

Dr. P. S. Schenck, Director of Public Health, has for many years been developing plans for a public health center for Norfolk. Judge William Day of the Juvenile Court is reported to have interested wealthy citizens in the project to such an extent that a large amount of money has been secured to definitely push the work. Proposed plans for the series of buildings have been drawn by Maxwell Hyde of New York, which, if carried out, will give Norfolk front rank among cities in this country in this important health movement. As far as is known, this is the first complete and comprehensive health center planned for this country which at the same time is related to, and has as a part of the group, the Juvenile Court and Detention House.

The accepted plan comprises the following buildings:

Court House.—This is the old Academy building remodeled to meet the needs of the Juvenile Court and the Court of Domestic Relations.

The Detention Home.—This building will house the juvenile dependents and delinquents until they shall be permanently committed or other disposition made of their cases by the court.

The Emergency Hospital.—This structure is the police or accident hospital and has little relation to the health center as such.

The Pre-Maternity Building.—This building, which is called by some "The Children's Building," is where the prenatal work and also the work of pediatrics of any children up to those of school age will be carried on.

The Administration Building.—This building includes the laboratories and the office of the health administrator of the city and his staff, the central administrative office and record office of the health center.

The General Medical Building.—This building houses all the clinics and is the center of the active dispensary work.

In designing this project, the architects

attempted to keep in mind the importance of not changing the character of the design of the old Academy which has been for a long time a landmark of this neighborhood. As far as possible the exteriors of the buildings have as little of the institutional aspects as possible. The colonial domestic type was adopted, as it lent itself well to this purpose. The wear and tear on buildings of this character is very great, so they are to be constructed of the most substantial materials, making rather a large initial expense, which is compensated for by economy in up-keep, repair and safety in case of fire. The central heating plant is to be installed in the basement of the Detention Building and will furnish heat for the entire group.

The Court House

The Court House will, when remodeled, have on the first floor the court room, the judge's office, waiting-rooms for whites and blacks, and the necessary offices for probation officers. In the basement are the detention rooms for those who are awaiting trial. The substitution of a detention room for the usual cell is a plan which has the hearty approval of distinguished authorities on penal institutions.

The rooms for the psychiatrists are attached to the court in the basement. On the second floor is located a meeting-room with a seating capacity of about 250 people which it is proposed to use for various meetings in connection with public health activities, parents' meetings and other activities of general public interest. This room can be used for instruction purposes when the lecture room in the children's building is not large enough. It will also serve as the exhibition room, which is essential in any public health campaign.

Detention Building

This building is the result of close cooperation and the experience of many institution heads in various parts of the United States, whose advice and criticism was sought and embodied in the final plans. The difficulty in planning a detention building is to arrange for the large number of segregations which it is necessary to make without having too large a building. This was cared for by making not less than seven segregate units. The basement of this building is to contain the heating plant for all the other buildings, the necessary storerooms, and the janitors' closets.

On the first floor is the general office, the waiting-room, the examination room, where the doctor examines all incoming cases, and the receiving bath and toilet. There are two living-rooms and two classrooms so arranged that by means of folding doors two large rooms will result. These can be arranged for technical training or any other purposes. There are two dining-rooms and a large, well-ventilated kitchen. Two play porches are important features of the structure. The second floor contains the living quarters for the superintendent, and the various bedrooms and dormitories. One of these rooms is to be set apart for those cases needing special study and observation.

Emergency Hospital

The Emergency Hospital is essentially a police hospital for accident cases. It is not intended to be an organic part of the health center. A room for children has been provided to take care of such tonsil cases as may come to the clinic, where it is found necessary to keep the child over night. The first floor is devoted entirely to the receiving-room, nurses' quarters, administration purposes, and the kitchen, diet kitchen, etc. The ambulance receiving-room is to be so arranged that minor surgical dressings can be done here and the patient immediately discharged where possible. In the basement is to be located a space for the ambulance and room for its attendant, also sterilizing-rooms, storage, etc. The second floor is divided into two sections, one for whites and one for blacks, and again subdivided for male and female cases. There are five private rooms which are not essentially "private" but are to be used for cases needing isolation and more quiet than could be found in the dormitories. On this floor is also the recovery porch with southern exposure. The bed capacity of the hospital is thirty.

On the third floor is a complete operating unit, consisting of operating-room, sterilizing-room, anesthetic room, doctor's office and wash-up room. The operating-room faces north, and the entire unit is well ventilated and isolated.

Children's Building or Pre-Maternity Building

The Pre-Maternity Building is to be used both as a maternity center and also for

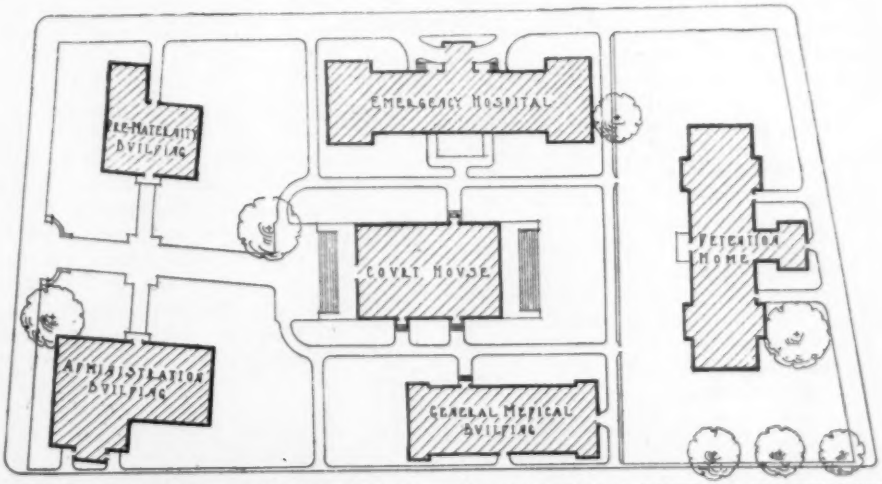
pediatric work for children up to school age. In order to make the building have as homey an appearance as possible, and overcome the diffidence of some women in going to large institutions, it has been designed more with the appearance of a large cottage than a clinic. The interior is to be brightly decorated, the furniture comfortable and domestic in character, placed as informally as possible, and the entire atmosphere friendly and homelike.

The visitor can enter by the front door or by the more private entrance at the rear. She enters a large waiting-room where she is met by a social worker who takes her history before ushering her into the doctor's office. Adjoining the waiting-room is a nursery where the children who so often accompanying the visiting mother are to stay while she is in the building.

There is a large lecture room for instruction purposes. A large plate glass permits those in the waiting-room to watch what is going on in the lecture room. This stimulates their interest and curiosity and they are only too anxious to get the much-needed instruction. The lecture room is to be equipped with the necessary sinks, table, scales, etc., and around the walls are open shelves for the display of babies' garments and fabrics, so arranged that the women can have easy access to them. It has been found that the interest in the display of inexpensive, dainty clothes for infants will bring the mother back again and again.

After the woman's history has been taken, she is conducted to the dressing-room with its necessary appointments, where she is prepared for examination in either of the two doctor's offices. These two offices are so arranged that they can be used not only as examining offices but also for treatment rooms.

On the second floor is another dressing-room and two more doctors' offices. A room is provided where the visiting nurses can prepare their reports and keep in touch with their cases. Here also is a model flat, consisting of combination kitchen and living-room, bedroom and bath. This is to be furnished with carefully studied and well-selected furniture and equipment in order to teach the women that it is not necessary to spend large amounts of money if knowledge and care are used in the buying. Each article is to be carefully marked with its purchase price. The bedroom can also serve the double purpose of rest or recovery room as may be required. It is also proposed to use the lecture room on the first floor as an instruction room for midwives, an essential part of any constructive maternity work.



PLAN OF HEALTH CENTER AT NORFOLK, VA., SHOWING RELATIVE POSITIONS OF BUILDINGS

Administration Building

This building contains on the first floor the drug dispensary with waiting-rooms for whites and blacks. It has a separate en-

trance so that those using it have no connection with the administration part of the building. A dumb-waiter leads to a room in the basement where material can be kept in bulk. A space is provided for the doctor who does the school vaccinations.

Space is also provided here for the general information office, the general record room, and the large room where the field force of the city health department can prepare its reports. On the walls of this room are cabinets for the health records and reports and for the keeping of the necessary literature distributed by the city health department. On the second floor are the executive offices of the city health officer and adjoining it the general office for the health department of the city. Here also is the laboratory for the city and the health center, with the necessary adjacent preparation rooms and glass washing rooms. On the roof are the animal rooms used in connection with experimental work done in the laboratories.

General Medical Building

In the General Medical Building are located the various departments which comprise the general medical and examination work and the dispensary work of the health center, exclusive of the work for children of pre-school age and for prenatal work.

The basement contains a complete X-ray department where it is proposed to do not only the X-ray work for the health center but also for the private physicians of the city. The experience of Bridgeport, Conn., is that this work not only carries the expense of the X-ray department but also shows considerable profit. The rest of the basement is devoted to the orthopedic department, comprising mirror and gymnastic room, general orthopedic apparatus rooms, foot-baking room, dressing-room and doctor's office. The general toilets for men and women will also be on this floor, as well as locker rooms for the attending physicians and nurses.

In order to avoid too large a plant for this building, it has been so designed that the same spaces can be used for various purposes at different times. It was also decided after careful consideration that in addition to the general waiting-room on the first floor it was advisable to have secondary waiting-rooms in connection with the separate departments. The visiting patient enters a large, well-lighted and ventilated waiting-room. In the center, controlling the entire room, is the desk where the first record is taken and the patient given necessary directions. To the right is the genito-urinary department, so arranged with a separate entrance that it can be used at night as a male clinic when the rest of the building is not in use. This same space can also be used as the gynecological department. It consists of a waiting-room, doctor's examining-room, four treatment rooms, arranged so that seven patients can be treated at once. In addition there is a microscopic room so that tests can be made immediately and the results given to the patient without delay. The stairs leading to the tuberculosis department are so placed that if there is need for a heavy service, the tuberculosis rooms can be used in connection with the genito-urinary section.

X-ray work for this department is to be done in the basement. One of these rooms can be used as a cystoscopic room. To the left is the general medical department, consisting of doctors' office, service room with sink, sterilizer, instrument cases, cupboards, etc., and six examination or treatment rooms, as may be required. The character of use and arrangement of time of use of this department will have to be decided by the medical authorities administrating the health center.

There are two stairs leading to the second floor, one for general use and one to serve the tuberculosis department. For this division there is a separate waiting-room, a doctor's office and three examination rooms. The other stairs serve the dental department as well as the divisions for eye, ear, nose and throat. Three dental rooms are provided, one of these being a sound-proof extraction room. There is an eye-testing room, sufficiently large to test a number of cases at once, a treatment room for eye cases, a doctor's office and small operating-room, and a general ear, nose and throat treatment room which is to be partitioned off so that a number of cases can be given simultaneous treatment.

Acknowledgment.—Prepared from papers by Mrs. Ruth Drew in *Greater Norfolk*, April, 1920, and Maxwell Hyde in the *Modern Hospital*, June, 1920.

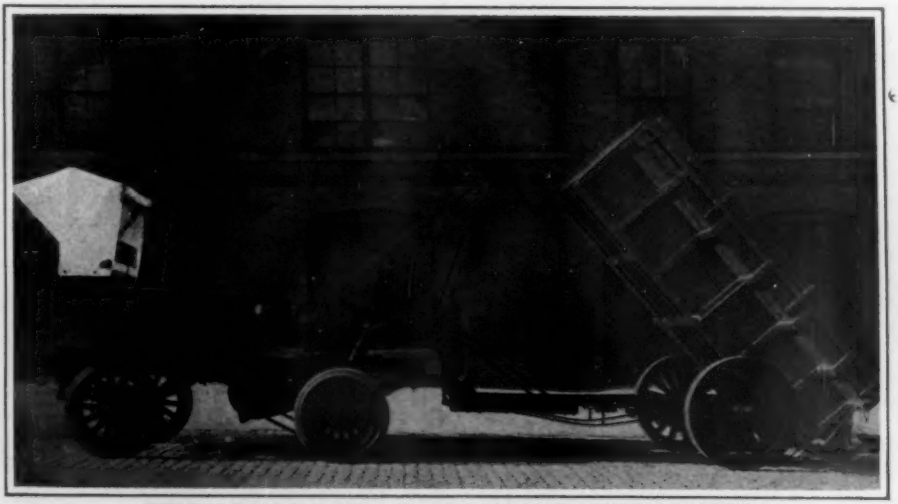
TYPE OF ELECTRIC VEHICLE USED IN PATERSON, N. J., FOR COLLECTION PURPOSES

Comparative Costs of Collecting Ashes and Garbage

Electric Tractors, Horse-Drawn Wagons, Gasoline Trucks and Dump Carts Compared

AN interesting comparison of the cost of operation of electric tractors with trailers having a capacity of 10 cubic yards each, horse-drawn wagons having a capacity of 3 cubic yards each, gasoline trucks having capacities of 7 and 10½ cubic yards each, and ordinary dump-wagons in use in Paterson, N. J., is given in the report of the Board of Public Works of that city by H. J. Harder, City Engineer.

Electric tractors, as shown in the illustration, collected a total of 55,401 cubic yards in 1919, the maximum haulage being in December and the minimum in January of that year. The average cost per cubic yard, including labor, was 45.42 cents per



THE ELECTRIC TRACTOR AND DUMP BODY IN DUMPING POSITION

yard, showing a maximum in February and a minimum in January.

The horse-drawn wagons collected a total of 81,360 cubic yards, the maximum in December and the minimum in June, the average cost per cubic yard being 53.73 cents, reaching a maximum of 71.67 cents in June and a minimum of 45.39 in March.

Gasoline trucks collected a total of only 5,522 cubic yards of ashes and garbage during the year, because from the month of April to November inclusive the gasoline trucks are converted into flushers. The maximum yardage collected in one month by these trucks was 2,291 cubic yards in January, and the minimum, 598 cubic yards, in March. The average cost per cubic yard was 53.53, the maximum, 86.35, being in March, and the minimum, 40.2, in January.

The accompanying table shows the cubic yards collected by months and a statement of the total cost and cost per cubic yard for each one of the collecting vehicles.

ELECTRIC TRACTORS

Month	Cu. Yds.	Av. No. in Service per Day	Av. No. of Loads per Day Each	Total Cost	Per Yd.
January	2,821	2	5.31	$960.35	.3404
February	3,460	2.83	4.79	2,674.86	.7730
March	3,630	2.71	5	1,764.84	.4861
April	5,060	3.88	4.85	3,171.58	.6268
May	4,810	4	4.63	1,864.36	.3876
June	4,960	4	4.52	1,698.83	.3425
July	4,950	3.85	4.7	2,244.28	.4533
August	4,590	4	5.3	1,901.92	.4120
September	4,820	4	4.6	2,508.42	.4050
October	5,210	4	4.8	2,259.07	.4336
November	5,280	4	5.16	1,939.53	.3673
December	5,810	3.82	5.46	2,179.96	.3752
Totals	55,401			$25,168.00	
Unit Cost per Cubic Yard					.4542

HORSE WAGONS

January	10,841	17.92	7.37	$5,464.28	.5040
February	9,314	17.18	8	4,653.20	.6430
March	9,909	16	8	4,497.48	.4539
April	7,786	13.39	7.54	3,895.20	.5002
May	5,483	10.22	6.44	3,284.66	.5990
June	3,333	7.44	5.72	2,388.76	.7167
July	3,622	6.92	6.44	2,236.36	.6174
August	3,467	6.91	6.15	2,209.33	.6373
September	3,627	7	6.54	2,220.00	.6120
October	5,122	9.33	7.1	3,116.00	.6083
November	7,777	13.64	7.48	4,138.50	.5321
December	11,079	16.17	7.28	5,610.81	.5109
Totals	81,360			$43,714.58	
Unit Cost per Cubic Yard					.5373

GASOLINE TRUCKS

January	2,291	2	5.81	916.99	.4002
February	1,893	2	5.65	920.17	.4861
March	598	2	5	516.42	.8635
April					
May					
June		Gas Trucks are converted into flushers during summer months.			
July					
August					
September					
October					
November				136.00	
December	740	1	5.70	466.50	.6304
Totals	5,522			$2,956.08	
Unit Cost per Cubic Yard					.5353

Schoolhouse Fire Hazards

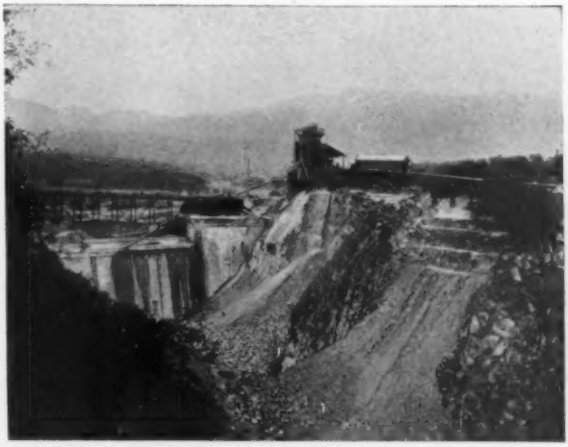
Fire losses on schoolhouses have been excessive for a number of years and are steadily increasing. Because of this fact, the experience of the insurance companies on this class was collated recently, and it showed that for the five years ending with 1917 the loss ratio has been 75 per cent. This means a heavy deficit, and, in consequence, an increase of rates on school property is inevitable.

Modern educational methods have greatly increased the schoolhouse losses through their introduction of new hazards. Manual training departments practically bring the factory hazard into the buildings in which large numbers of children are housed. Kitchens are provided for the domestic science department and for the serving of meals to the pupils. Moving-picture machines are in general use for educational purposes and entertainment, and the chemical and physical laboratories all present serious fire hazards. In addition, there is the increased use of school buildings as social centers for parties and dances and public meetings, involving the cigar and cigarette hazards, due to the carelessness of spectators.

Controlling the Floods of Los Angeles County

How Motor Trucks Helped in the Construction of the Big Dam, which Impounds 6,600 Acre-Feet of Water

WATER, like fire, is a source of great blessing, but in many locations it must be controlled or it will be just as great a source of damage. The waters of Los Angeles County, Calif., coming down from the mountains, cause floods that for years have done considerable damage to property in the various flood districts. Realizing the need of action to control these floods, the California Legislature adopted the Los Angeles County Flood Control Act, in 1915, and this was later adopted by the Board of Supervisors of the Los Angeles County Flood Control District. J. W. Reagan was engaged as engineer to investigate carefully the best plans to control the flood and to conserve such water for beneficial purposes. These plans were, in brief, as follows:



DEVIL'S GATE DAM HAS A STORAGE CAPACITY OF 6,600 ACRE-FEET

First, the construction of both large and small dams in the mountainous areas; second, the protection of the banks of the smaller streams together with the spreading and storing of the waters of these streams for beneficial use; third, the straightening and rectification through river training and bank protection of the major streams, and fourth, protection to the harbors and shipping interests.

One of the projects was at a point where La Canada-Verdugo Road crosses the Arroyo Seco, locally known as "Devil's Gate." Here was to be constructed a concrete masonry dam, 130 feet high, which would impound 6,600 acre-feet of water.

The amount of $3,600,000 was designated for this control work, including the "Devil's Gate Dam." However, before the work could be well under way, landowners, bankers, civil and commercial organizations represented that realty values were so depreciated on account of the damage by flood waters that the amount must be increased, if

AN EXCELLENT VIEW OF THE SIDES OF THE DAM. THE ESTIMATED COST IS $209,000

necessary, to correct this damage. In fact, so valuable were the dams in the minds of the people, that the engineer was able to secure all rights of way for channels without a cent of cost to the district.

DEVIL'S GATE DAM REQUIRED 600,000 SACKS OF CEMENT

The following facts regarding the "Devil's Gate Dam" will show the extent of the project. The dam is made of plain concrete or cyclopean masonry containing large stones, the top being 130 feet above the solid bed rock. For stability the dam depends entirely on the force of gravity; for added strength, however, it is arched up-stream in plan to a radius of 400 feet. In addition to the duty of this structure as a dam, it carries over its top La Canada-Verduga Boulevard, with a 20-foot roadway, and sidewalks on either side. This roadway is wide enough to carry a street railway should the necessity arise.

The storage capacity of the reservoir created by this structure is 6,600 acre-feet, the principle being for joint conservation and flood control. Its discharging apertures are controlled by hydraulically operated gates which are large enough to release 7,000 cubic feet of water per second. This volume is considered the maximum safe carrying capacity of the natural channel of the Arroyo Seco below the dam.

The surplus of any storm greater than 7,000 feet will be retained in the reservoir, as it is large enough to reduce 7,000 second-feet, the flood of a storm 50 per cent greater than the storm of February, 1914. The dam and reservoir not only give flood protection to the city of Los Angeles and a material reduction to the flow of the Los Angeles River in flood times, but conserve the stored flood waters of the Arroyo Seco for the beneficial use of the city of Pasadena and other cities of the southeast.

The top of the dam is 1,069 feet above mean sea level. The estimated cost of the completed work is $209,000; this is for construction alone, as the site was given free by the city of Pasadena and private owners.

The illustrations show something of the size of the dam. Such a structure requires a vast quantity of material, and more than 600,000 sacks of cement were used. This material was hauled from the railway station some miles away. The Selden truck operated by Smith & McCormick made regular trips on this work.

Because of the necessity of rushing the work on the dam, every effort was put forth to speed it up. The highest type of ma-

NOTE THE BROAD TOP OF THE DAM WALL. IT WILL ACCOMMODATE A STREET RAILWAY

chinery was used and in keeping these machines and the scores of men busy, dependability of transportation was a very important and essential feature.

ACKNOWLEDGMENT.—Illustrations courtesy of Selden Truck Corporation.

The School Motor Bus Ignores the Weather

IN the old days when means of transportation were lacking it was necessary for the country children to trudge their way—often two or three miles, perhaps longer—to the nearest schoolhouse, and when weather conditions made walking out of the question the pupils were forced to stay away from school, thus hampering their chance of obtaining as good an education as existing circumstances would allow them to receive.

Nowadays conditions are quite different; good roads and speed-wagon busses make it much more efficient to take the pupils to centrally located grade schools. There they find teachers who are specialists; they are quickened by the competition of others of their own age, and they have the aid of modern equipment. Weather and road conditions do not prevent the pupils from being in school, for these busses run all year round—on good roads and bad, through snow-drifts and mud-holes, and never fail to make the trip and get the children to school.

A "cheap" education is costly.

Courtesy of Reo Motor Car Co.

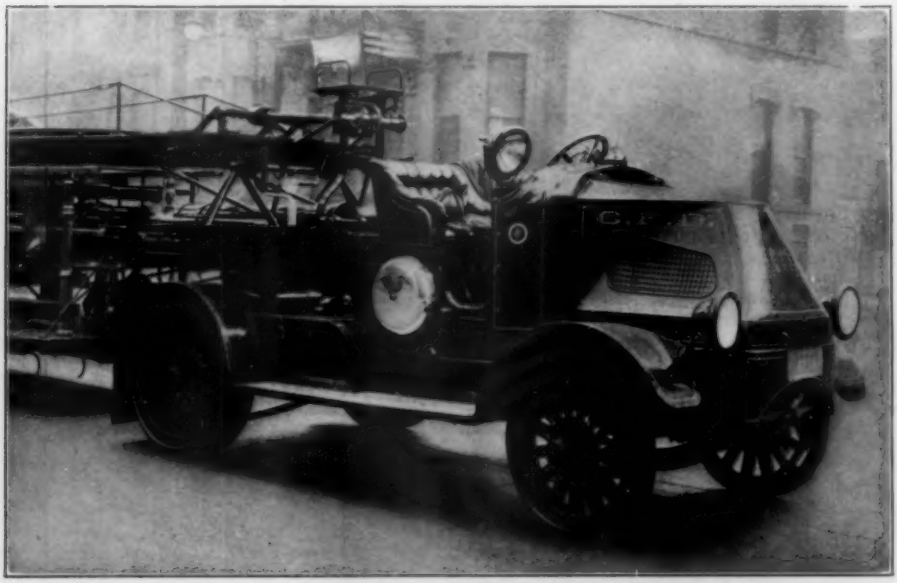
A PAIR OF BUSSES USED BY THE RIVERSIDE CONSOLIDATED SCHOOL DISTRICT, CALIF.

Health Education an Essential

The health of children in school should not only be maintained, but it should, on the average, improve from the time that they enter the school if the teachers both teach and practice, as any rational system of education would require, the principle of health. Any school which sacrifices the pupils' well-being is a failure.

Summer or Winter the Motor Truck Serves the Community

INTENSELY COLD WEATHER DOES NOT PREVENT AMERICAN-LA FRANCE MOTOR FIRE APPARATUS FROM SUCCESSFULLY COMBATING THE FIRE PLAGUE



A MACK TRACTOR FOR HAULING AN AERIAL, PART OF THE EQUIPMENT OF THE CHICAGO FIRE DEPARTMENT

BOONE COUNTY, INDIANA, FINDS THIS SERVICE MOTOR TRUCK ALMOST INDISPENSABLE IN ROAD WORK

A survey of the counties of the United States recently conducted by THE AMERICAN CITY shows that there are a great number of counties, particularly in the Central States, owning and purchasing 3- to 5-ton trucks for road building.

ONE OF THE MOST UNIQUE MOTOR VEHICLES IN EXISTENCE AND THE LARGEST PASSENGER-CARRYING MOTOR VEHICLE EVER BUILT

This bus was designed by D. W. Templin, Engineer of the Goodyear Company, for service in Akron, Ohio. It has 4 wheels in the rear, with tandem axle drive. Equipped with one of the newest types of street car bodies, with side entrance and exit, pay-as-you-enter arrangement, adjustable windows, upholstered seats, and electric lights, the 6-wheeler, seats 44 passengers and with standing room will accommodate 90. It is on giant Goodyear pneumatic tires and has a 60-cylinder, 75-horsepower engine.

Rural Schools That Serve Effectively

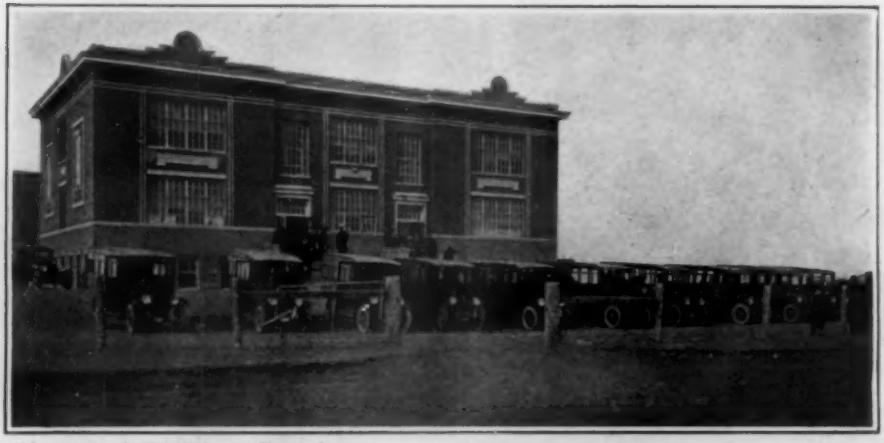
By R. P. Crawford
Associate Editor of "The Nebraska Farmer"

IF we assume that half of the children of the country live in rural communities, —and this assumption is approximately correct—by all rights they should receive half of our attention.

We have now abandoned approximately 50,000 of our little one-room schools and replaced them by some 12,000 consolidated structures, which compare favorably with the great majority of our city schools. Probably three-fourths of these one-room schools have disappeared in the last ten years. A tremendous wave of consolidation has been sweeping the Middle West.

In order to ascertain just where we stand at the present time in this matter, we received telegraphic reports on June 19 from the leading states on the number of consolidated schools. State Superintendent L. N. Hines reported approximately 1,000 consolidated schools in Indiana on that date, and for strictly bona-fide consolidated schools, Indiana should probably be awarded the first place. Ohio reported 910 consolidated and centralized schools, which to all intents and purposes here are the same thing. Iowa, perhaps the newest arrival in this game, has jumped into third place with approximately 415 consolidations. North Dakota reported 543 consolidated schools, but in that state the law classes as a consolidation any school with two or more teachers and serving eighteen sections. It is, however, a remarkable record for that state. To all appearances, Iowa has edged Minnesota out of her rank, which on June 19 reported 310 consolidated schools. However, if relative farming conditions and settlement of land were taken into consideration, Minnesota would rank near the top, if not at the very top. Colorado, notwithstanding the mountainous country, reported 115 consolidations on June 19, and some of these schools are among the finest in the entire country. Massachusetts reported that 2,160 out of 2,972 school buildings have two or more rooms and that 96 per cent of the public school pupils in that state are attending schools of two or more rooms. There are many other states in this country that are beginning to forge ahead in the matter of consolidation.

A. O. Neal of the United States Bureau of Education reported thirty-three states in the United States with 8,404 consolidated schools, and that the best estimate the country over is approximately 12,000. It will be noted that the few states just mentioned



By courtesy of "The Nebraska Farmer."

THE SARGENT SCHOOL IN COLORADO. THE EQUIPMENT INCLUDES TEN MOTOR BUSSES, AND THE SCHOOL SERVES 100 SQUARE MILES OF TERRITORY. ON SUNDAY IT IS USED AS A UNION CHURCH AND SUNDAY SCHOOL

above have approximately one-fourth of the consolidated schools in the entire country. Indiana alone has one-twelfth of the entire number, and up to this spring had abandoned approximately 4,000 or one-half, of its one-room schools.

In rating consolidated schools, the kind of buildings erected should be taken into consideration as well as mere numbers. There are some states that are little better off with consolidated schools, as far as equipment is concerned, than are some one-room and two-room schools that are not consolidated. In such states as Minnesota, Iowa, Ohio, Indiana and Colorado they are bona-fide consolidations for the most part, with good, substantial buildings, a large proportion with high school facilities, and transportation systems in connection with most of the schools. Before a state can lay claim to being a leader in consolidation, it should be shown that one-room schools are actually abandoned to form the consolidation, that high schools are maintained in at least a fair proportion of schools, and that transportation is furnished. If this is not done, many states, through peculiarities in law and classification of schools, might seem to be leaders in the consolidated school movement, when in reality states reporting far fewer consolidations would be actually ahead in real work accomplished.

How Consolidation was Fostered

How have these leading states been able to make such great strides in getting rid of their one-room schools? It is not such a mystery as one might suppose. Nearly every one of these states has had some special legislation that not only provided for consolidation, but helped the matter along. For instance, Indiana's law provides that every one-room school with less than fifteen pupils *may* be closed and that every school with less than twelve pupils *shall* be closed, provided, of course, that the typographical conditions make it possible to abandon the school. There you have one of the keynotes to Indiana's success in consolidation.

Likewise, Ohio has a law that when the average daily attendance of any school in the school district for the preceding year has been below ten, the school shall be suspended and the children transported to another school. These schools are designated in the law as consolidated schools in distinction to centralized schools where the proposition is voted on by the people. Our reports from Vernon M. Riegel, the State Superintendent in that state, on June 19, indicated that the number of consolidated schools was 600 and the number of centralized schools 310. A few years ago Ohio completely revised its entire system of school laws.

In Minnesota, the most important factor in promoting consolidation has been the excellent system of state aid. Minnesota can give practically every one of its consolidated schools $3,000 or $4,000 state aid every year and not miss it from its great school fund. Its system of making schools live up to requirements in every particular, from approving in detail the plans and requiring all consolidated schools to be modern, to the hot lunch which must be served every noon, is perhaps unequalled in this country.

Add to these factors which promote consolidation a few live advocates in every state, and you have a winning combination. For instance, in Colorado C. G. Sargent of the State Agricultural College has been talking consolidation for years. The same is true of Iowa with Macy Campbell of the Teachers' College, and Mr. Dick and Mr. McClenahan of the State Department.

In practically every case the state laws have not only made consolidation easy, but have also done something definite to promote it.

We can't sit down and wait for consolidation, any more than consolidation can wait for good roads. As one Indiana county superintendent told me a few days ago, "If we had waited for good roads before consolidating, we should have had neither schools nor the roads." Farming itself waits on education, and yet the more rapid the advancement in farming, the more rapid will be the advancement in education.

ACKNOWLEDGMENT.—From an address delivered before the Department of Rural Education, National Education Association, at Salt Lake City, July 6, 1920.

Snow Removal, Hauling, City Grading and Road Making

Every winter the question of snow removal is of vital importance to city officials, park commissioners, and industrial plants. The solution to the whole problem is in getting to work when the snow storm commences, and being able to clear the snow faster than it falls or drifts.

The "Caterpillar" Tractor is the one successful power method for removing snow from city streets and country highways. It meets every need for a highly effective machine capable of bucking snow drifts, ice, sleet, working fast and at a minimum cost.

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Municipal Finance

BONDING **ACCOUNTING** **TAXATION**

Municipal Budget Standards

THERE are two outstanding purposes to be achieved through a municipal budget. In the first place, the budget is the sailing chart for the administration. It is a plan of campaign drawn up for the approval of the elected representatives of the people by those who must carry on the city government. In the second place, the budget is a document of public information. It is the most important single statement laid before the public by the municipal authorities, because its central feature is the plan of action of the administration, reflecting in financial terms the services to be rendered by the city and the financial burdens to be laid upon the city.

The Budget as a Means of Public Education

The second outstanding purpose of a municipal budget is public education. Our whole system of government is based on the belief that the people can govern themselves better than anyone else can govern them. It is clear that the success of our experiment in democracy depends in the long run upon the intelligent interest of the people in the affairs of government. Now that our cities have become large and the public business extensive and complicated, it is necessary for the government to take active steps to keep the public informed. The city budget can and should be one of the chief means of arousing public interest and extending public knowledge about the affairs of city government.

The problem, then, is to make the city budget understandable by the average citizen. In approaching this task, the first thing to be remembered is that there is nothing more bewildering and uninteresting than columns and pages of figures. Therefore, as part of the budget, there must be a brief running story that explains the important features of the budget plan so that anyone can understand it. This must be followed by a comparatively few summarized financial statements showing the budget plan in its relation to past operations and to future tax levies. In support of the running story of the budget and the summary statements, there should be presented the detailed estimates, the fund and debt statements, and the proposed text of appropriation and revenue measures.

The sporting page of any newspaper presents a suggestive model for a city budget. Take the leading baseball story. You will find a live text story of the high spots of the game supported by the detailed box score. Take the reports of a great football game. You will find a thrilling text story with a graphical presentation of the game and a number of pictures of the crucial moments supported by the line-up and the score by quarters, and this in turn by a detailed analysis of individual plays. We have talked of improving our governmental processes by following English models and German models and by adopting the methods of big business. Certainly in the effort to make our budgets interesting we must follow the suggestions of the American journalist.

In all of our cities the budget with its detailed supporting estimates should be published for distribution. A carefully prepared release should be drawn up for the papers, and interviews should be given to press representatives.

Before presentation of the budget plan to the legislative body for final adoption, a public hearing should be held. Responsible members of the administration should also avail themselves of every opportunity to explain the budget to the citizens in meetings of their regular civic, commercial, social and religious organizations.

There is one more method of "putting the budget across" that should be mentioned, and that is the budget exhibit. Through such an exhibit in a temporarily vacant store or in the concourse of the city hall,

Which type of Culvert do you prefer ?

WE make the Half-Round type of culvert from "Genuine Open Hearth Iron" and they can be readily used when the fill is not sufficiently heavy to permit the use of the right size of round riveted pipe for the capacity needed. The bottom sections can be had in lengths of 6, 8 & 10 feet, thereby giving a more rigid culvert than if the bottom were made of shorter sections. The top sections on the other hand are made in multiples of two feet.

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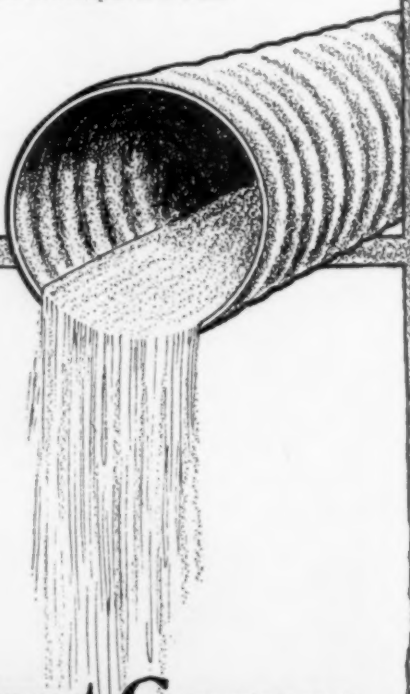

ROUND Riveted Full Circle Corrugated Metal Culverts have come into almost universal use all over the country. Their value is well understood for general use on main highways; they are the best and are invaluable on secondary roads where the service demanded is much greater. Corrugated metal culverts made of any grade of material, are much more easily handled and installed than any other form of culvert construction; but where permanency has to be considered, it is well to have them of the best grade galvanized iron sheets that are on the market. Our "Genuine Open Hearth Iron" is the best. Send us your address so we can send you further particulars.

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the administration can present through wall charts and through other concrete methods a large part of the outstanding information of the budget. The dry-as-dust figures can be converted into real pictures and objects which will serve to attract and enlighten public interest in budget problems.

Prerequisites of Planning and Control Through the Budget

The budget as a means of planning and control rests upon many factors. There cannot be a satisfactory budget system unless the municipal government itself is organized so as to make planning possible. A unified plan for the administration of the city government cannot be made by a series of independent governmental agencies. There must be a central executive with power to draw up a plan determining the proportionate emphasis to be laid upon the various governmental services. Our cities must have health service, schools, water, sewers, waste disposal, police and fire protection and the many other necessities of civilized urban life. We must have these things in proportion, and proportion demands a single plan which will include all services. It has already been recognized in the cities of the state of New York that the preparation of the budget should be entrusted to the chief executive. We have already applied in our cities, though not yet in our state government, the sound principle expressed by Alexander Hamilton in 1788 when he stated: "The preparation of the plans of finance falls peculiarly within the province of the executive department." The organization of the city government under a single responsible executive authority is a prerequisite of an effective budget system.

A second requirement of a sound budget system is freedom in planning. There can be no real budget planning, no planning that is of constructive value, in a city in which the restrictions placed upon the use of the cities' funds or upon the amount of tax which can be raised have been outgrown. The creation by statute law of specific restricted funds for each and every municipal activity has served to tie the hands of the administration to such an extent that its efforts are diverted from careful budget making to a policy of arbitrary allowances or to a scheming endeavor to find methods of evasion. It is clearly impossible to ask a city administration to draw up a sailing chart when the helm is tied fast with charter restrictions.

A third requirement of a sound budget is that the budget must be complete. It is impossible to make an adequate plan unless all the factors are considered together. Each of the services and projects to be financed must be considered in relation to all the other services and projects, and the need for funds must be balanced over against the available revenues, taxes and loans. When any of these elements are omitted from the budget, the budget becomes a partial plan and as such is only partially satisfactory.

A further requirement is a complete and modern system of accounting. It is impossible to plan for the future without a thorough knowledge of the experience of the past, and without accurate accounts the municipal executive cannot know the financial condition of the city and the financial results of past operations. It is also through accounts, primarily, that budget control is exercised.

The standardization of supplies and the correlative classification of personal services and standardization of salaries are essential in a sound budget system. Sound planning involves a consistent salary policy throughout the entire municipal administration. It demands that clerks who are doing the same grade of work with the same loyalty and efficiency in the various departments shall be paid the same salaries and shall receive similar increments. The budget must reflect the salary policy and the supply standards of the city administration. If the administration has no well-thought-out plan along either line, its budget will fall short of being a completely worked-out plan for the city government. Because of the fact that salary and supply standards cannot be prepared, considered and adopted in the necessary rush of budget preparation, and because such standards need not be altered extensively from year to year, their formulation and adoption may be regarded as a prerequisite of a sound budget system.

The preparation of a municipal budget is no simple task. Even the smaller cities burn the midnight oil in jamming through the necessary work. There are estimates to be collected, corrected and tabulated, hurried conferences with department heads to

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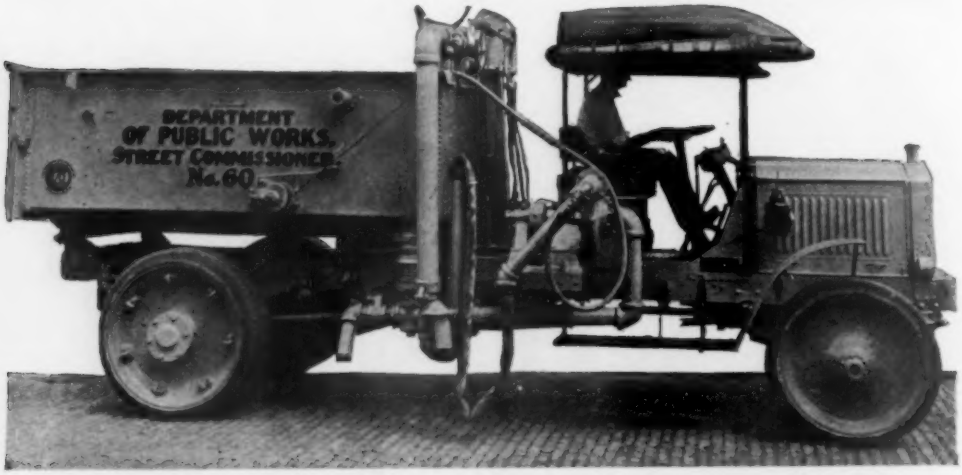

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be held, committee meetings to be attended, financial statements to be prepared, printer's proof to be read, difficult problems to be settled, differences of opinion to be reconciled, and a thousand and one other things to be attended to that no one would think of unless he had taken a hand in the actual preparation of a budget. In some cities the time allowed by charter is far too short. In others, the first steps are taken so long before the beginning of the fiscal year for which the estimates are made, that is is impossible to make valid plans. In still other cities the budget is not completed until after the beginning of the fiscal year, and for the first months the government continues without an authorized plan of administration; and, as Controller Evens has observed, the collection of taxes is so delayed that the city is driven to financing itself with temporary loans, the interest cost of which in this state amounts to from three to four million dollars a year. The budget cannot be a well-considered plan nor an adequate means of control unless the municipal financial calendar is set up to meet the needs of the budget.

The municipal budget becomes a means of control only on ratification by the legislative body of the city. This ratification is expressed in the appropriation acts, in the tax levy and in the other revenue and borrowing measures. In order to guard against the undue restriction of the executive, lump-sum appropriations should be made wherever complete executive responsibility is fixed. The determination of tax, revenue and borrowing measures should coincide with the determination of appropriation measures. These measures embody the outlines of the budget plan and should therefore be considered and adopted or amended as a unit.

The budget as reflected in appropriation and revenue measures cannot be a controlling plan unless it is made binding upon the administration. If the policies laid down in the budget may be altered from time to time at the whim of the administration, if appropriations may be increased freely, if surplus revenues may be expended at will, the budget becomes a farce. There is little value in going through the motions of preparing and adopting a municipal budget, unless the budget becomes a binding plan. While appropriations must not be so highly segregated as to cripple efficient administration, and while there must be a method of meeting genuine emergencies, it is essential that the city budget shall be a fixed and final plan of administration.

The execution of the budget—the expenditure of the city's funds, the collection of the taxes and revenues, and the negotiation of loans in accordance with the appropriation ordinance and the finance measures—must for the sake of efficiency be left to the executive. In order that the executive may be bound by the terms of the budget plan, there must be a financial officer independent of the executive and responsible for the current audit of all accounts and financial transactions. The budget cannot be made a means of effective control unless an independent audit is provided.

To sum up the conditions mentioned as essential to make the budget an adequate means of planning and control:

1. There must be a single executive authority.
2. The city administration must have freedom in planning.
3. The budget must be a complete plan.
4. There must be a modern system of accounting.
5. Salary and supply standards are necessary.
6. The financial calendar must meet the needs of the budget.
7. There must be legislative ratification of the budget as a unit.
8. The ratified budget must be a controlling instrument.
9. There must be an independent audit of the execution of the budget.

To summarize the essential methods of making the budget a more adequate means of public information, we may say:

1. The budget must contain a brief text story explaining the budget and calling attention to the questions of chief public interest in addition to the brief financial summary and the detailed supporting data.
2. The budget should be published for public distribution.
3. No effort to secure publicity for the budget, whether through the press or through public gatherings, should be overlooked.
4. There should be a public hearing on the budget.
5. A budget exhibit should be held by the city administration.

LUTHER H. GULICK,
New York Bureau of Municipal Research; Special Counsel, Special Joint Committee on Taxation and Retrenchment of the New York State Legislature.

ACKNOWLEDGMENT.—From an address delivered before the New York State Conference of Mayors and Other City Officials at Jamestown, N. Y., July 7, 1920.

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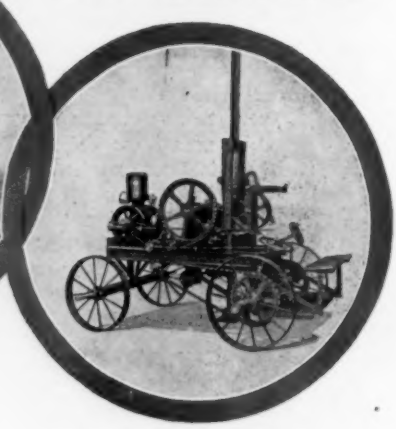

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News and Ideas for Commercial and Civic Organizations

Tying the Home to the Community

WICHITA FALLS, TEX.—Emphasizing the common tie of neighborhood betterment and the promotion of wholesome democratic social life brings the people within a community more closely together and develops mere residents into real citizens. Realizing that Wichita Falls in its new era of growth in population is made up largely of newcomers, the Chamber of Commerce is endeavoring to tie the families throughout the city definitely to the community through the formation of block organizations and "block parties."

The discovery of oil in Wichita County is largely responsible for the city's increase in population from 8,500 in 1910 to approximately 45,000 in 1920. Naturally, the advent of so many newcomers brought about a social condition which was both gratifying to the statistical department and exasperating to the General Secretary of the Chamber of Commerce. It is impossible to hold a family whole-heartedly unless some sort of claim upon the home, including the wife and mother and the children, is established. The fact that the head of the family has a good business connection down-town does not make citizens of the entire family.

The Chamber of Commerce decided to bring the residents together in an old-fashioned town hall convention. Letters of invitation were sent to the names on the Chamber's membership list, and to a mailing list made up from the city directory and the telephone directory. The meeting was also advertised in the daily papers. The keynote of this foregathering was "more neighborliness." It apparently struck a responsive chord in every heart, and the spontaneous expressions of approval that came from the crowd indicated that human beings desire, above all else, pleasant associations with their fellows. One man stated that he had attended church many times during his two years' residence in the city and that he had made only one or two friends. "I know only four people in this audience," he said. "I do not know whether it is my fault or yours, but I want to know you. I was a citizen of the town I came from. I took part in lodge and church, school and chamber of commerce affairs. I do not want merely to live in Wichita Falls. I want to be a citizen. I am with you in this new movement."

One speaker related the story of Henry Grady, the Georgia orator, who told that on one occasion he and his wife were living in a New York apartment for several weeks. One morning he saw a doctor coming out of the house from one of the upper floors. In his small-town Southern way, trying to be neighborly, he stopped the doctor and said, "Doc, is someone sick here?" The doctor looked at him as if he thought he was a strange animal, and said briefly that a man was sick but that he did not know who he was or anything about him. After considering with his wife whether or not they ought to go in and sit up with the sick man, as was the custom in a little town, he felt the coldness and lack of neighborliness and decided that in the community into which he had moved it was not the custom to do that sort of thing. A few days later a coffin was brought down-stairs and borne away, with one or two vehicles attending. Grady accosted one of his fellow cliff-dwellers and asked him if someone was dead in the house. The other man, a typical city dweller, said he supposed so, as there was a hearse out in front, but he had never met the family up-stairs, did not know who they were or anything about them. Grady asked if he intended to go to the funeral. He said no. Grady's naturally friendly heart was appalled at this lack of neighborliness. He went back to his apartment and said, "Annie, let's go back to Georgia where they know when you get sick and care when you die."

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not alone in this class. There is too much of this spirit in all our American cities, and it was in the belief that it is a duty of the Chamber of Commerce to make the community a better place in which to live that this body undertook the block organization for neighborliness and for civic improvement.

At the first meeting referred to, the town was divided into twelve districts. A district convention was called in each of the districts and advertised through the newspapers and by means of letters sent out from the Chamber of Commerce. Speakers were coached to present the idea of neighborliness and civic improvement. A district chairman was elected at each convention, and an organization committee was appointed to carry the idea back to the blocks. The people in the blocks were invited to meet in block parties at the homes designated by the chairman of the district. At the block meetings, block chairmen and secretaries were elected.

The district chairmen are members of the senate of the Community Forum; the block chairmen are members of the house of representatives of the Community Forum. The Forum's general meetings are held at the Chamber of Commerce.

Aside from promoting social life and neighborliness, the Forum provides an efficient piece of machinery by which the Chamber of Commerce can communicate with every home in the city on short notice and enlist all the people in any movement for the good of the community.

The central committee having charge of the work was the City Betterment and Beautification Bureau of the Chamber of Commerce. This committee laid down very few rules and regulations, believing that any group of American citizens when gathered together will find their own best means of enjoyment and progress. As a result, these block parties have taken various turns in different parts of the city. As summer came on, the meetings were held on the lawns. Recently Community Service, Inc., sent a representative here to assist us, and many features of the work have been incorporated into the block organizations.

The movement has become very popular and appears to be solving one of the great basic problems in many cities: that is, it is making the people feel that the town belongs to them and that they belong to the town; that they have a duty to perform as citizens; and that citizenship is not only the making of a living but includes the making of a life.

HUBERT M. HARRISON,
Secretary, Wichita Falls Chamber of Commerce.

The Columbia Basin Reclamation Project

SPOKANE, WASH.—For the first time in their history, Portland, Seattle, Tacoma and Spokane have come together on common ground and joined hands in a common issue. The competition for trade territory among these busy, ambitious Pacific-Northwestern communities is of more or less common knowledge. The issue in which they have joined hands is the Columbia Basin project, that vast reclamation undertaking by which it is proposed to make nearly two million acres of arid and semi-arid land in central Washington blossom like a garden.

The Columbia Basin project had its beginning in the investigations conducted by state and federal engineers a quarter of a century ago. They ascertained by soil surveys that no lands in the United States are more fertile than these, and proved that in the magnificent stretches of Lake Pend Oreille there is an enormous storage and catch-basin amply sufficient for all require-

SAGE BRUSH LAND LIKE THAT SHOWN ON PAGE 319 YIELDS ORCHARDS LIKE THIS WHEN RECLAIMED AND IRRIGATED

Aeroplane view of Los Angeles, Cal.

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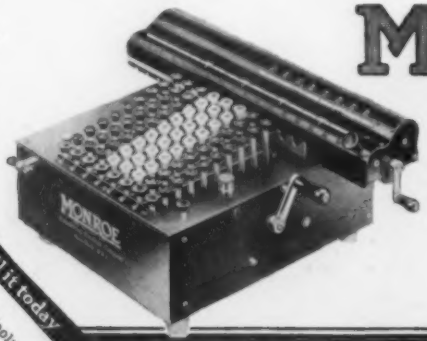

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ments under the most exacting conditions imaginable.

The climate, altitude and drainage slope in this section all lend themselves to maximum results from intensive cultivation upon the completion of the enterprise. Three transcontinental railroads cross the area to be reclaimed; there are splendid roads intersecting it in all directions, and settlement and agriculture reach to the very edge of the district.

E. F. Blaine, a Seattle resident of vision, revived the idea a few years ago at a conference with the Spokane Chamber of Commerce, and pointed his argument with the astonishing results that had been secured in the Yakima project, of which he was the father. Mr. Blaine said that what was gained in the Yakima undertaking—a return of more than $50,000,000 annually from an area of 300,000 acres—could be duplicated six-fold in the Columbia Basin. The suggestion fell on fallow ground, until the war came with its unprecedented demands, and the nation was found to be but a few strides ahead of a general shortage of food. The necessity for action then brought to mind Mr. Blaine's suggestion.

The Spokane Chamber of Commerce took the initial steps this time. Ultimately an appropriation was secured from the State Legislature, with a commission charged to determine the possibilities of the proposal. The federal reclamation authorities' interest was secured, and the work has proceeded. The preliminaries have been accomplished, and now the executive factors remain to be dealt with. To forward these, the cities of Seattle, Portland, Tacoma and Spokane, as said before, have joined forces. Their leading business men have put their heads together, and the organized business interests are solidly cemented in the determination to alter the status of the Columbia Basin project from promise to accomplishment.

The united effort of the four cities has crystallized into a weekly committee meeting participated in by all of them. Some members travel 350 miles and back to attend these sessions, but are always in attendance. The next big event scheduled in behalf of the project is the great Northwestern Irrigation Congress, to be held in Seattle September 16-17.

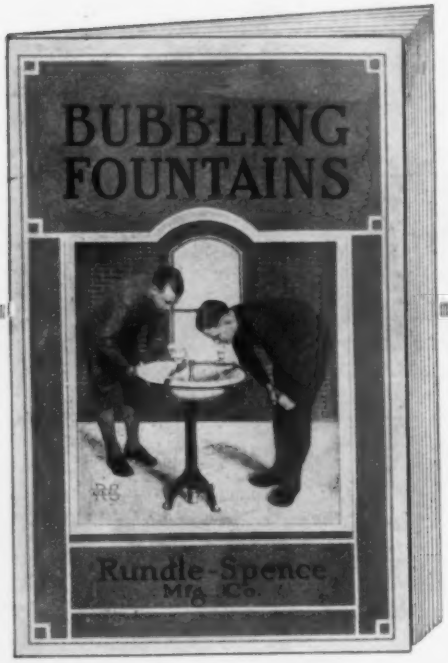
Aside from the great contribution to the prosperity of the Pacific Northwest and the nation, the Columbia Basin project gives every indication of teaching a lasting lesson in interstate and intercity coöperation and coördination.

TYPICAL SAGE BRUSH IN THE COLUMBIA BASIN. CONTRAST WITH ILLUSTRATION ON PAGE 317

MAJOR R. A. LAIRD,
Publicity Secretary, Spokane Chamber of Commerce.

Minot Association of Commerce Enlarges Quarters

MINOT, N. DAK.—The rapid growth of the Association of Commerce of Minot, N. Dak., has necessitated the leasing of the entire second floor of one of Minot's office buildings. Remodeling is already in progress. The immediate cause for expansion is the addition of a Traffic Department, which opened for business this spring. There has also been a demand for membership meetings of the Association at stated intervals, and the assembly room was too small to accommodate the present mem-



CLEANLINESS SUPREME IN BUBBLING FOUNTAINS

For convenience and cleanliness in drinking the stream of minimum slant that insured all the water falling to one side is an improvement over both the vertical type and the streams slanting from 30 to 50 degrees for it cannot draw the falling water back into the ascending column and yet it possesses the copious drinking feature of the vertical stream and eliminates the inconvenience of the stream of decided slant.

The Complete Safety and Convenience of "Vertico-Slant" Fountains

The slight angle of the "Vertico-Slant" fountain obviates the necessity of a special valve for drawing water to fill a glass or cup as an individual drinking cup may be readily filled as from a faucet.

Finger contamination is practically eliminated, as the nozzle as located at the bottom of a recess protected by a wall on either side, discourages the attempt. This feature makes it possible to dispense with a protective shield as is necessary with many slanting jet fountains. The "Vertico-Slant" is so built that the nozzle cannot be touched with the lips. The free and open construction of the fountain offers no harboring place for germ life. By dispensing with the detachable drinking heads featured by some manufacturers and making the fittings so they can be removed only by one equipped with the necessary tools, tampering and pilfering are prevented.

The "Vertico-Slant" Fountain Overcomes All Objections

All "Vertico-Slant" Fountains are made with extra heavy vitreous china bowls, glazed inside and outside, sufficiently heavy to withstand abuse and, if chipped, will not show a rusty surface as is the case with enameled iron.

An essential element in the successful operation of drinking fountains is a uniform pressure and where there is a great variation, it is necessary that an approved type of water pressure regulator be used.

Full descriptive literature and a copy of our 1920 bubbling fountain catalog will be sent to any city officials or industrial plants interested, upon request.

RUNDLE-SPENCE MANUFACTURING COMPANY
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bership. The new assembly room will be built out of the two assembly rooms now used by the Odd Fellows and the Association. It will be 45 by 45 feet, and it is expected that nearly the entire membership can be accommodated at dinners. When the hall is completed, a stage and dressing-room will be added at one end, and a kitchen will be equipped. The rest of the floor will be occupied by the administrative offices of the Association, and by the Traffic Department.

Four years ago the business of the Association of Commerce was conducted in two small rooms. When the new plans of the Association are matured, the organization will occupy a space 50 by 130 feet, all devoted to the business of building up Minot and the northwestern part of the state.

WILL E. HOLBEIN,
Secretary, Minot Association of Commerce.

A Phase of Public Safety

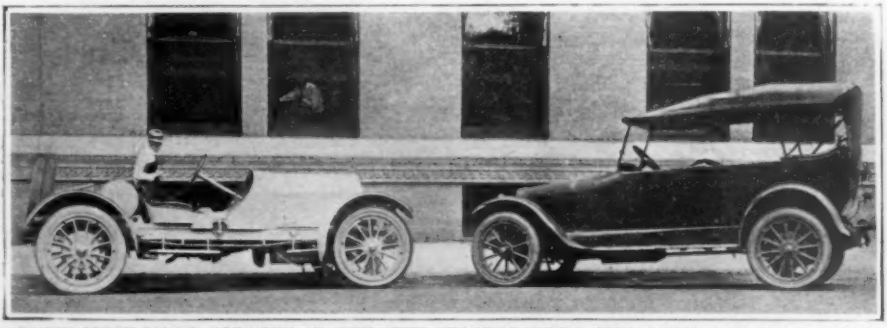
By Pierce Atwater

Secretary, Civic Division, Civic and Commerce Association, Minneapolis, Minn.

PRACTICALLY every active chamber of commerce is obliged to grapple with the problem of accident prevention. Automobile and other vehicular traffic is admittedly one of the greatest causes of accidents. The police department attempts to regulate traffic and enforce careful driving. The official traffic force, however, is of such small size that it can correct only the most flagrant violations of the traffic ordinance. Because of the limited funds appropriated for nearly every police department, as well as the inadequate personnel of the traffic force, an effective campaign in the education of the driving public can not be easily conducted by the city officially. Education in careful driving and on the need for complying with the traffic ordinance must be undertaken by some private organization coöperating with the police authorities.

The Minneapolis Civic and Commerce Association has for some years past conducted educational work with respect to careful driving and the prevention of accidents. Until two years ago the plan adopted was to give wide publicity to the fact that the Association desired to have reported to it all instances of careless driving in which the traffic ordinance had been violated. The citizens of Minneapolis, after being encouraged to report such cases, did so in great numbers. The license number of the car reported was looked up, and a courteous letter was sent to the offender, calling attention to his offense and appealing to his public spirit to be more careful in the future. For the second or third offense the individual was called into court, and if the offense was serious enough he was usually fined.

After trying out this system for two years, the Committee on Accident Prevention reached the conclusion that it was not preventing a sufficient number of accidents caused by careless driving and, further, that a polite note sent to a violator, calling his attention to the fact that because of his



IF WE MUST MAKE GARAGES OF THE CITY STREETS, LET'S NOT PARK CARS LIKE THIS

For every municipal requirement

Mack TRUCKS

"What really interests the truck owner is ton-mile costs and the ability to deliver goods in the quantity and at the time that each job requires it. From this standpoint, our Macks have more than made good."—*From one letter of hundreds we should like you to read.*

Each Mack truck is a dependable unit. Its efficient, patented cooling and lubricating systems account, in part, for its economy of operation and maintenance. The Mack is adaptable to every municipal motor truck requirement—fire fighting, street flushing, road building, ash and garbage collecting or tree protection. A list of municipal Mack fleets now in use will be sent upon request.

Distinctive Mack engineering features, combined with 18 basic Mack patents, have developed the motor truck the world is talking about.

Capacities 1½ to 7½ tons. *Tractors to 15 tons*

Our latest catalogues, Nos. 13 and 39, will be sent upon request. They contain a detailed description of the many exclusive features that have made Mack supremacy possible, together with the complete specification of every model. Send for them today.

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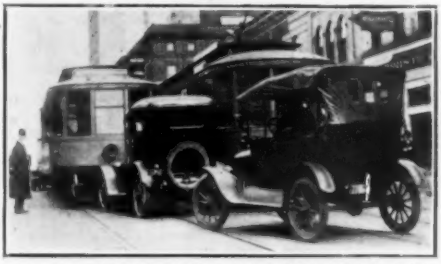
"PERFORMANCE COUNTS"

careless driving he had nearly killed Mr. John Smith, was both bad form and poor judgment. The committee therefore decided that some new plan must be adopted whereby Mr. Violator could be called upon the carpet and sufficiently penalized—so much so that he would hesitate to continue his careless practice of endangering the lives of his fellow citizens.

Realizing the necessity of such a plan, the committee offered to organize for the Police Department a force of men that could be commissioned special traffic officers and actually make arrests and take flagrant violators into court. The Police Department agreed to assign a lieutenant as the director of this force, and to give him the necessary clerical assistance. A special room was provided where violators could be interviewed. The Committee on Accident Prevention then set about to obtain the services of men interested in traffic work to be commissioned as police officers. After two months of work, the committee selected sixty-four men who agreed to be



ARE YOU TROUBLED WITH THE "SUICIDE CUT" IN YOUR CITY?

appointed as special traffic officers under the following pledge:

"I hereby apply for appointment as a special traffic officer, with the understanding that the duties involved will be to meet the regular monthly assignments for evening work and all emergency calls emanating from the headquarters of the Police Department.

"In addition to this special work, I understand that the duties of a special traffic officer are conscientiously to correct violations of the traffic ordinance as I see them committed daily on the streets of Minneapolis."

Some of the members of the Association's Committee on Accident Prevention and other business men who had had previous experience in traffic work and who thoroughly understood both the city ordinance and the state law in regard to traffic were selected by the Chief of Police as the eight squad leaders in this organization. Before the commissions were actually given to the men, several meetings were held at which municipal judges and police officers explained what the duties of the leaders would be, and instructed them in all phases of traffic work. After this course of in-

TURNING IN THE MIDDLE OF THE BLOCK. IT IS AGAINST THE LAW AND A PUBLIC NUISANCE

struction was over, badges and commissions were given to the men and each was assigned to a certain squad and instructed to do no individual work until he had had experience under competent direction. During the first meetings of these squads more attention was given to the instruction of the members than to the correction of violations, and this plan was pursued until all the members were thoroughly acquainted with their duties. With the organization details and the instruction finished, the campaign of educating the driving public was commenced.

The method of actually making an arrest is important. The tags provided by the Police Department are in two parts. One half is retained by the officer making the arrest, and the other, with a string attached to it, is tied onto the machine or handed to the driver. The tag retained by the officer gives the license number of the car, the name and address of the driver, the section of the traffic ordinance violated and the date, time, place and number of the officer making the arrest. On the other side is ample space for detailed remarks. The stub given to the offender gives the license number and date, and states: "You have violated the traffic ordinance, Section No. ....," with the number of the officer making the arrest. On the other side the stub reads: "Please report to Room 25, City

The Champion Snow Plow Can Be Easily and Quickly Attached to Any Standard Truck

Keeping the streets open

No county, state or city wants to face the losses sustained by so many communities last Winter when traffic was tied up and business suspended by heavy snowfalls.

Labor is scarce and expensive. Hand removal is difficult at best and often impossible. The simple solution is an ample equipment of Champion snow plows which will keep your roads and streets open during and after the heaviest snowfall.

We have greatly increased our production this year in an endeavor to meet every order. Bulletin KDT containing detailed information is now ready and will be sent on request.

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"Everything for the Roadmaker"

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Hall, at 9 A. M. You are released through courtesy, and failure to report as directed makes you liable to arrest," and is signed by the Superintendent of Police.

After the organization work was under way, the Secretary of the Civic Division began the publication of a monthly bulletin to traffic officers, in which the officers were kept informed on everything that was happening in the traffic field, and containing a report of the number of arrests and the work of the individuals and of squads. In this bulletin also each squad was assigned two definite dates on which it was to work during the month. The administration of the special police officers was in direct charge of the Police Department, but an executive committee composed of the eight squad leaders of the special traffic officers, the lieutenant in charge of this division of the Police Department, a representative from the Minneapolis Automobile Club and of the Minneapolis Civic and Commerce Association, and a secretary furnished by the Association, served in an advisory capacity to the Superintendent of Police.

The special night work of the organization has not been the most important feature. The committee in charge of the special officers feels that the most effective work has been accomplished at times when the officers were not on special duty, by their conscientiously correcting traffic violations as they saw them committed while going about the city upon their daily business. On two occasions during last summer the entire force was called out, once making 600 arrests and the other time approximately 500. A few jolts of the driving public against a force armed with authority has established a realization of the fact that the city streets do not belong to individual drivers. It is no longer a common thing to see a Ford without a tail light, or to see the best-paved streets of the city made into speedways, nor is it common to see automobiles pass open gates of streets cars. Other similar violations are continuously checked. If a fire occurred in a theater, the people could emerge from the exits without having the street blocked by automobiles parked there. And the drivers of cars have ceased to leave them standing in front of fire hydrants.

The less important details of the city traffic ordinance have also been impressed upon the minds of the drivers, not because they have suddenly become interested in the traffic ordinance on account of its being entertaining reading, but because a good percentage of the driving public have at some time or other during the last year been arrested, taken to the police station, given a copy of the traffic ordinance, and told that if they come again they will be sent to court.

But all offenders do not get off so easily. Since active operations began on the first of June, 1919, 25,201 offenders have paid a visit to the police headquarters. Of this number, 3,365 have been sent to court, convicted and fined. These have been the most flagrant cases of carelessness, and the penalties have ranged from a one-dollar fine to ninety days in the workhouse.

The only basis of comparison in figures of this kind is to take as examples similar months in two different years. As the work has been in progress at the time of writing only fourteen months, the only two months that can be compared are June and July of 1919, and June and July of 1920. Under practically the same traffic conditions, with the exception of an increase of 47 per cent in the number of automobiles in use, it is found that serious violations of the traffic ordinances were decreased in June, 1920, by 88 per cent, or from 376 to 176; and in July, 1920, by 42 per cent, or from 261 to 183. The figures are the number of serious cases that were taken into court and received fines or workhouse sentences.

It might be surmised that the decrease in the number of serious offenses is caused by a lack of vigilance on the part of the Special Officers. This, however, is not true, as the number of arrests made in June and July, 1919, totaled 2,045, while the number of arrests in June and July, 1920, totaled 3,941.

It is a little difficult to visualize a picture from these figures, but briefly it is this: with nearly twice the number of automobiles running the streets of Minneapolis in 1920, and the Special Traffic Officers checking up every violation with which they came in contact, 1,896 more people were arrested in 1920, than in 1919, but the number of court offenses decreased very materially. Thus these figures tell their own story, and to add a touch of human interest, this article is glad to record that while there were two

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Right now is the time to arrange for your snow plows to assure good delivery. Baker Auto Truck Snow Plows are readily attached to practically any make motor truck. They are serviceable—sensible—safe.
They are equipped with our especially convenient lifting device. The blades are hinged and allow passage over obstructions without shock. Plows are made with 8 and 10 foot blades.
Hundreds of Baker Plows are in use in the Snow Belt and are giving real service.

We also make 20th Century Horse Drawn Snow Plows for sidewalk work

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CONNERY'S Tar Kettles for Efficiency

PRACTICAL
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30 Styles

10 to 1000 Gallon Capacities Carried in Stock

Non-Leakable Welded "Held by the Weld"

Style "O" 100 Gallon—With Aeroil Burner Attached. Burns either Oil or Wood. (No Smoke, no Dirt, Intense Heat)

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fatal automobile accidents in June, 1919, there was only one in June, 1920; and while there were three in July, 1919, there were but two during the same month in 1920. The record of minor and serious automobile accidents would be in the same proportion, but definite figures have not yet been compiled.

This story shows very clearly that the "Specials" have been continuously pressing the lever harder in the stricter enforcement of the ordinance and that the driving public is becoming more careful and law-abiding. It is needless to say that the "Specials" as an organization are well known, and, with at least some of the people of the city, are none too popular. This fact does not bother them, however, and the organization has received the heartiest support from all the civic organizations, all the municipal departments, including the regular traffic force, and from the daily papers.

Simultaneously with the active work in the field, a publicity campaign has been conducted. A series of pictures has been run, illustrating the different ways in which the traffic ordinance is continuously being broken and the possible results in damage to property and loss of life. These two forces, working together, have brought the public consciousness to the point of understanding the necessity of accident prevention, which up to the inauguration of this work received almost no consideration. The constructive work that the special traffic officers have done for the city is beginning to make the public realize that the subject of accident prevention should be given as much attention as the community gives to the other factors of civic betterment. Many cities in America are beginning to realize that it is wiser to expend effort and money upon preventive measures than to expend a great deal of time and a larger sum of money in salvage work.

This is especially true of the safety movement. The Minneapolis Civic and Commerce Association feels that it must incorporate into the very foundation of the community life the thought that by employing preventive measures properly, life and property can be conserved. It realizes, of course, that the solution of the traffic problem is not the only means of reaching this end, but chambers of commerce and other civic bodies must appreciate the great need for urging the adoption of preventive measures in our industries, among our school children and in our homes. When this idea becomes a part of us, we shall cease to look upon "Safety First" as a subject to be discussed once in a while during the year, and we shall begin to realize that it is a component part of the civic consciousness of the community. The chamber of commerce can do much toward furthering the cause.

On the Calendar of Conventions

SEPTEMBER 7-10.—HOLYOKE, MASS.
New England Water Works Association. Annual convention. Secretary, Frank J. Gifford, Dedham, Mass.

SEPTEMBER 9-11.—LOUISVILLE, KY.
American Association of Park Superintendents. Annual convention. Secretary, Emmet P. Griffin, Superintendent of Parks, East St. Louis, Ill.

SEPTEMBER 13-17.—SAN FRANCISCO, CALIF.
American Public Health Association. Annual meeting. Secretary, A. W. Hedrich, 169 Massachusetts Avenue, Boston, Mass.

SEPTEMBER 20-23.—NEW ORLEANS, LA.
Southwestern Water Works Association. Annual convention. Secretary, E. L. Fulkerson, 617 Washington Street, Waco, Tex.

SEPTEMBER 21-22.—DETROIT, MICH.
American Water Works Association, Central States Division. Annual convention. Secretary, R. P. Bricker, Shelby, Ohio.

SEPTEMBER 27-28.—HARRISBURG, PA.
Pennsylvania State Chamber of Commerce. Annual meeting. Secretary, George E. Foss, Telegraph Building, Harrisburg, Pa.

SEPTEMBER 27-OCTOBER 1.—MILWAUKEE, WIS.
Annual Safety Congress. Secretary, S. J. Williams, 168 North Michigan Avenue, Chicago, Ill.

OCTOBER 1-3.—URBANA, ILL.
Better Community Conference. Annual conference. Held under the auspices of the University of Illinois. R. E. Hieronymous, Community Adviser, Urbana, Ill.

OCTOBER 6-8.—MCPHERSON, KANS.
League of Kansas Municipalities. Annual convention. Secretary, Albert A. Long, University of Kansas, Lawrence, Kans.

OCTOBER 10-15.—ST. LOUIS, MO.
American Society for Municipal Improvements. Annual convention. Secretary, Charles Carroll Brown, 404 Lincoln Avenue, Valparaiso, Ind.

OCTOBER 13-14.—BOSTON, MASS.
Massachusetts Chamber of Commerce. Annual meeting. Secretary, Edward G. Stacy, 6 Beacon Street, Boston, Mass.

OCTOBER 13-15.—AMHERST, MASS.
American Civic Association. Annual convention. Secretary, E. E. Marshall, Union Trust Building, Washington, D. C.

OCTOBER 14-19.—COLUMBUS, OHIO.
American Prison Association. Annual congress. General Secretary, Joseph P. Byers, Frankfort, Ky.

OCTOBER 19-22.—NEW ORLEANS, LA.
International Association of Municipal Electricians. Annual convention. Secretary, Clarence R. George, Houston, Tex.

OCTOBER 25-27.—CHICAGO, ILL.
National Association of Commercial Organization Secretaries. Annual convention. Secretary, F. D. E. Babcock, Chamber of Commerce, Worcester, Mass.

NOVEMBER 8-12.—CHICO, CALIF.
League of California Municipalities. Annual convention. Executive Secretary, W. J. Locke, Pacific Building, San Francisco, Calif.

NOVEMBER 15-17.—CINCINNATI, OHIO.
City Managers' Association. Annual convention. Executive Secretary, Harrison G. Otis, 812 Tribune Building, New York City.

NOVEMBER 16-18.—LOS ANGELES, CALIF.
Fire Marshals' Association of North America. Annual convention. Secretary, George H. Nettleton, St. Paul, Minn.

Another FEDERAL

Federal five ton truck flusher operated by the City of Lincoln, Nebr.

The experience of others is always the best guide by which to buy motor trucks.

There is a veritable wealth of evidence that shows that municipalities have found full value in the Federals they operate. The letter that follows from T. J. Hensley, Supt. of Streets and Public Improvements, is only typical:-

"In reply to your inquiry of recent date, beg to say that I have been using the Federal Five ton truck on the streets of Lincoln for the past eight months and have found it more than satisfactory in every particular There is mounted on it a 1200 gallon Flusher tank, and it handles it under all conditions with perfcet satisfaction. I am not boosting for any special truck, but we have pretty nearly all kinds of trucks in service in the City Departments, and in my opinion the Federal Truck is far superior to any truck we now have in service, and while I have no interest in any special make of truck, I would gladly recommend the Federal truck."

"Traffic News", an interesting magazine of haulage and transportation, will be mailed you free on request.

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This is the sign of the Tenth Year Federal, a sign significant of ten years of success in every field of truck transportation.

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The City's Legal Rights and Duties

Information for City Attorneys and Other Municipal Officers, Summarizing Important Court Decisions and Legislation

Conducted by A. L. H. Street, Attorney at Law

Where Municipality Has But Easement Over Street or Alley Abutting Land, Owner May Prevent Removal of Tree or Structure Not Interfering with Public Use

A recent decision of the Minnesota Supreme Court has important bearing on municipal control over alleys and streets where, as seems to be almost universally true, the municipality does not own the land occupied by such ways in fee simple, having but an easement for the purposes of public travel. It is held in the case of Pederson vs. City of Rushford, 177 Northwestern Reporter, 943, that municipal authorities have no right to require the removal of trees or structures encroaching upon an alley where neither constitutes an interference with existing public use. Affirming judgment in plaintiff's favor for damages for removal of a wood shed and tree from an alley at the rear of plaintiff's lots, the Minnesota Supreme Court said:

"The abutting lot owner owns the fee to the center of a platted street or alley and his ownership includes trees growing therein. The public has but an easement and the abutting owner may use the land for a purpose compatible with the use by the public of its easement. . . . .

"The alley has never served a general public purpose. There has never been a definite route of travel through it. The tree was not an obstruction to public use. The woodshed was at a point where the alley was not capable of practical use for purposes of travel. The ground was steep and rough and immediately graded into a precipitous bluff up which traffic was impossible. There was no intention on the part of the authorities of the city, when the notice was given, to grade the alley nor to put it into condition for public travel.

"The case is fairly within the principle of West vs. Village of White Bear, 107 Minn. 237, 119 N. W. 1064, where the destruction of trees within the limits of a street was enjoined, and other cases cited above. The tree was not an obstruction to public travel nor was it taken for a public use. The use made by the plaintiff of the alley for his woodshed was compatible with any actual or contemplated use by the public."

Under Legislative Authority Municipalities May Require Certain Commercial Vehicles to be Licensed

The Legislature can authorize municipal authorities to require that a license be obtained for all vehicles engaged in carting for hire, whether under special contracts, or where the employment is publicly solicited. (New York Supreme Court, Appellate Division; W. N. Stevenson, vs. Hartman, 181 New York Supplement, 465.)

Extent of Liability of Municipality for Failure to Light Streets

"The lighting of streets is a discretionary or governmental function, and a city is not liable for failure to light them, even though it may own its own plant for that purpose, unless such lighting is necessary to warn travelers of some defect or obstruction in the street, or unless its charter or some general act of the Legislature imposes on it the duty to light them. The mere power given it by charter to light its streets does not render a city liable for failure to exercise such power. The duty to do so must be expressly created by statute to create liability." (West Virginia Supreme Court of Appeals, Holsberry vs. City of Elkins, 103 Southeastern Reporter, 271.)

A Contract, Although Invalid by Reason of Authorization by Less than Required Number of Councilmen, May be Ratified by Council Acting as a Body

A provision of a city charter that, "every ordinance, order or resolution, appropriating money, creating any liability of

Make Streets Clean

"Studebaker Model"

FLUSHING and SPRINKLING UNITS

Forty feet from curb to curb—sand filled brick pavement—cleaned in one trip with three nozzles.

The machine has four nozzles which can be used discharging one, two or three flushing streams at the same time.

Removing the heavy accumulation of Winter or the lighter dirt of Summer is within the range of this machine due to the adjustable nozzles and the independent control of the pressure.

A horse-drawn uniform pressure flusher is provided where conditions do not justify investment in a motor flusher but where economical, efficient and sanitary cleaning is desired.

Inquire of any motor truck manufacturer or ask the truck dealer in your city for complete information on **"STUDEBAKER MODEL"** flushing and sprinkling units mounted on their trucks, or address

Municipal Supply Company

South Bend, Indiana

the city, awarding or approving of any contract for the payment of money, shall require a four-fifths vote of all the members of the city council," applies to a contract creating an obligation on the part of the city to furnish steam for power. Such a contract authorized by three of five councilmen is of no effect. Such a contract, being one which the city had power to make, may be subsequently ratified. Ratification can only be by the city council acting as a body. It may be effected by any action or contract which gives to the contract the stamp of approval and this may be done by acquiescence with knowledge of the facts. (Minnesota Supreme Court, Tracy Cement Tile Company vs. City of Tracy, 176 Northwestern Reporter, 189.)

Issue of Municipal Bonds Not Invalidated by Misnomer

That municipal bonds may have been inaptly designated as "Park and Boulevard Bonds" will not invalidate their issue for the authorized purpose of providing funds for the establishment and extension of a recreation system, holds the Michigan Supreme Court in the case of Common Council of City of Detroit vs. Engel, 173 Northwestern Reporter, 547.

Where City Has Obtained Benefit Under Defective Contract Allowance of Claim by Council Will Not Be Set Aside

Where a city has the power to enter into a contract, but the manner of the exercise of the power is irregular or defective, and the city purchases, uses, and still retains property purchased under such irregular proceedings, no element of fraud or lack of consideration being shown, the allowance of the claim by the city council will not be set aside at the suit of a taxpayer. (Nebraska Supreme Court, W. L. Stickel Lumber Company vs. City of Kearney; 173 Northwestern Reporter, 595.)

Where City's Bonds Are Invalid, City Not Liable to Other Than Original Purchaser

A subsequent purchaser of bonds of a municipality, which were void because issued under an invalid statute, cannot recover from the city, even though the original purchaser from the city, who made a payment into the treasury, might recover the amount thereof, for to support an action for money had and received there must be some privity existing between the parties in relation to the money sought to be recovered. (Kentucky Court of Appeals, City of Henderson vs. Winstead; 215 Southwestern Reporter, 527.)

Rebuttable Presumption of Validity of City Ordinances Contained in Compilation

Ordinances contained in the compilation of a city's ordinances are presumed to have been regularly adopted and to be in effect, although the signature and authentication of the several ordinances do not appear. But defects in ordinances in their enactment for failure to comply with statutory provisions are not cured by their inclusion in a compilation. (Iowa Supreme Court, Barrett vs. Chicago, Milwaukee & St. Paul Railway Co., 175 Northwestern Reporter, 950.)

Under Constitutional Provision for Removal of Appointed Officers, Official Elected by Mayor and Council Held Appointed

The clause of the Pennsylvania Constitution which provides that appointed officers other than judges and the superintendent of public instruction may be removed at the pleasure of the power by which they shall have been "appointed" is held by the Pennsylvania Supreme Court in the case of Commonwealth vs. Likely, 110 Atlantic Reporter, 167, to authorize removal of a city clerk, chosen under a statute providing for his "election" by the Mayor and Council. The word "election" in such a statute is regarded as a substitute for "appoint"; the term "elect" properly signifying selection by popular will.

Not Unlawful Discrimination for City to Fix Water Rates by Reasonable Classification of Consumers

Proper classification of patrons by a water corporation, municipal or otherwise, is permitted, and the city of Erie, and the commissioners of water-works in such city did not unlawfully discriminate in requiring users beyond city limits to pay 25 per cent over city rates and actual cost of extension of the service into their respective proper-

A Modern Lighting System

does *not* require separate Lamp Standards as this street scene clearly shows.

Missoula, Montana, is one progressive western city utilizing "ELRECO" Combination Railway and Lighting Poles, which makes separate Lamp Standards unnecessary.

The "ELRECO" Steel Poles support ornamental lighting brackets with modern General Electric Lighting units; also, the span and service wires of the Railway and Lighting Company; keep the streets free and unobstructed from extra Lamp Standards, wooden poles, and a multiplicity of wires, etc.

The usual practice of financing such an installation is to divide the cost between the local Street Railway and Lighting Company, Merchants and the City, making the cost of "WHITE WAY" very reasonable.

What other progressive cities have accomplished is well illustrated in our handsome Catalog "F", sent on request to those interested.

Electric Railway Equipment Company

CINCINNATI, OHIO.

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ties. (Pennsylvania Supreme Court, Youngman vs. Commissioners of Waterworks, 110 Atlantic Reporter, 174.)

In Voting Under Recall Statute Incumbent Cannot Be Removed Unless Successor is Voted For

A city officer is not removed from office by a vote of a majority of the voters for his recall, where no votes are cast for a successor, there being no vacancy in office unless a successor is voted for and fails to qualify, under the California recall statutes. In reaching this conclusion in the case of Cohn vs. Isensee, 188 Pacific Reporter, 279, the California District Court of Appeal said:

"The purpose of the recall statute is to enable a majority of the voters, voting at any recall election, to remove an unfaithful or undesirable incumbent of any elective office of the city or town. But if, as in the instant case, no nominating petition has been filed nominating a candidate for the office, and if, therefore, no name of such nominee be printed on the ballot, then, even though a majority of the voters vote 'Yes' on the question of the incumbent's recall, their purpose must be frustrated if they are not to be permitted to write in the name of any person as their choice for the office."

City Ordinance Requiring Milk Offered for Sale to Be Pasteurized Upheld

The ordinance of Milwaukee requiring milk sold in the city, except certified milk and tested milk, to be pasteurized by the holding or the flash system is a regulation for the protection of the public health, within the discretionary power of the council, according to the decision of the Wisconsin Supreme Court in the case of Pfeffer vs. City of Milwaukee, 177 Northwestern Reporter, 850.

Unauthorized Consent to Placing of Electric Wires in Public Ways

"When consent to use a city's public ways can be obtained only from its own legislative assembly, and in a particular mode (in this case by an ordinance), the administrative officers cannot waive the necessity of procuring consent from the assembly, and in the prescribed mode. Neither can they, by acquiescing in the use of a public way by a utility corporation, estop the city to terminate the use." (Missouri Supreme Court, Holland Realty & Power Company vs. City of St. Louis, 221 Southwestern Reporter, 51.)

City's Duty to Abutting Owners in Constructing Tunnels in Streets

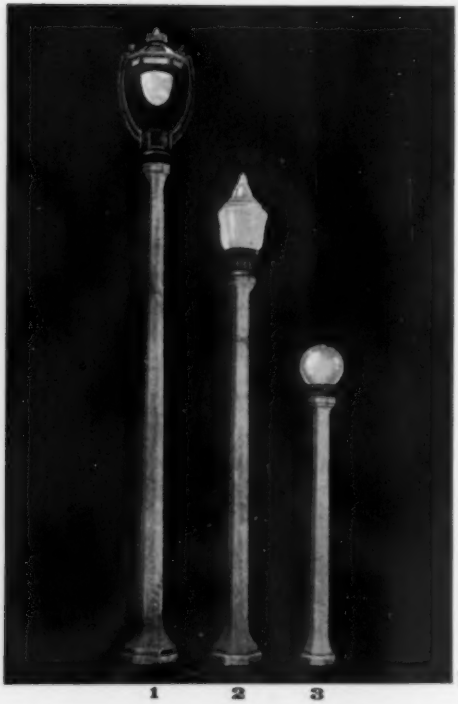
Where a city undertakes to construct a tunnel in a street the fee of which is in the abutting owners, it must use ordinary skill and care to sustain the land of the abutting owners. (Porter vs. City of Los Angeles, 189 Pacific Reporter, 105.)

City's Title to Public Way Not Divested by Non-User

That the rights of Missouri municipalities in lands dedicated to use as alleys are not lost by mere non-user and that such lands are not governed by the low of adverse possession which applies to private ownership of land, is shown by the decision of the Supreme Court of the State in the case of Marshall vs. City of Springfield (221 Southwestern Reporter, 17). Plaintiff unsuccessfully attempted to quiet title to a strip of land which had been dedicated for use as a public alley, on the ground that defendant city had abandoned or was estopped to assert any rights to the strip. Deciding the case in favor of the city the Missouri Supreme Court says:

"Appellant's claims of abandonment and equitable estoppel are predicated on the same facts, viz., the non-use of the strip of ground as an alley, the failure of the city authorities to open, grade, or otherwise improve it, and their action, not only in permitting appellant to occupy and use it in a way inconsistent with its use as an alley, but in assessing it in her name and collecting from her taxes thereon. The questions thus presented are not new, but have been heretofore fully considered and passed on adversely to appellant's contentions. The rule obtains in this state that a city has no power to part with the title to its streets which it holds in trust for the public except by a valid vacation. The designation of the public way in question as an alley does not withdraw it from the influence of the rule. It was given and accepted as a public alley. It is therefore a highway, and not a private way. The right of the public to use the way, and not the size of the way or the number of persons who may choose to exercise the right, determines its character.

"The principle of equitable estoppel has been applied by this court, in exceptional cases, to municipal corporations in matters pertaining to their governmental functions, but the facts of this case do not bring it within the doctrine announced in those."



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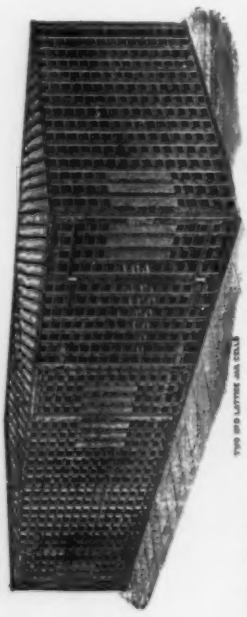

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Municipal and Civic Publications

SOCIAL THEORY.
G. D. H. Cole, Fellow of Magdalen College, Oxford. Frederick A. Stokes Company, New York. 1920. 220 pp with bibliography.

An analysis of social theories by the author of "Self-Government in Industry," "Labour in the Commonwealth," and other works. It aims to describe the state based upon a functional organization of society, such as that conceived by the proponents of Guild Socialism. While picturing a society grouped somewhat along the lines of a system of soviets, the author proposes a state with powers strictly limited to the fundamental political purposes of government.

PROCEEDINGS OF THE ELEVENTH NATIONAL CONFERENCE ON CITY PLANNING.
The University Press, Cambridge, Mass. 1920. 207 pp.

This volume contains the addresses presented at the Conference held at Niagara Falls and Buffalo, May 26-28, 1919. It includes papers on such topics as planning industrial subdivisions, planning problems of industrial cities, civic centers, and residential zoning. A very considerable part of the volume is devoted to various phases of regional planning, with papers presenting the subject both in general and in detail. This book not only describes a number of important recent projects in city planning, but discusses theoretically the principles that govern city and regional planning in the present and near future.

COMMERCIAL RECREATION
The Cleveland Foundation Committee, Cleveland, Ohio. 1920. 155 pp. Maps and illustrations.

This report on commercial recreation is one of the seven sections of the report of the Recreation Survey of Cleveland conducted under the auspices of the Cleveland Foundation A complete list is given in the back of the volume. The survey covers all the forms of commercial amusement found in Cleveland, including motion pictures, billiard rooms, dance halls, amusement parks, and other kinds of popular entertainment. The report comprises a brief summary of general conclusions and a digest of city ordinances on commercial amusements.

PUBLIC PROVISION FOR RECREATION.
The Cleveland Foundation Committee, Cleveland, Ohio. 1920. 198 pp. Maps and illustrations.

This report on public provision for recreation is one of the seven sections of the report of the Recreation Survey conducted under the auspices of the Cleveland Foundation. It covers in detail the subjects of playgrounds, school gardens, school community centers, municipal bath houses, public parks, and the Public Library. The volume concludes with a brief summary of conditions with recommendations

TECHNICAL WRITING.
By T. A. Rickard, Editor of the "Mining and Scientific Press," San Francisco; special lecturer at Harvard, Columbia, McGill, Stanford and California. First Edition. John Wiley & Sons, Inc., New York. 1920. iv + 178 pp.

THE LUNCH HOUR AT SCHOOL.
Katherine A. Fisher. Prepared for the Bureau of Education by the Child Health Organization of America. Published by the Bureau of Education, Department of the Interior, Washington. 1920. 61 pp. Illustrated. (Apply to the Bureau of Education.)

WOMEN AND HOUSING.
Report of a Conference of Women's Organizations, held at the "Daily Mail" Ideal Home Exhibition, Olympia, London. The Garden Cities and Town Planning Association, London, W.C. 1. 1920. 23 pp. (Apply to the Secretary, 3 Gray's Inn Place, Gray's Inn, London, W.C 1.)

REPORT ON STREET LIGHTING COSTS IN THE LARGER CITIES OF THE UNITED STATES.
Prepared by F. W. Ballard & Co., Cleveland, Ohio. Figures corrected to July 1, 1920.

REPORT OF THE FIRE MARSHAL OF NORTH DAKOTA.
Sixth Annual Report. For year ending June 30, 1919. H. L Reade, Fire Marshal. 9 pp.

REPORT OF THE COMMITTEE ON LEGISLATION OF THE CITIZENS' UNION.
Sixteenth annual report, covering the regular session of 1920 of the New York State Legislature. The Citizens' Union, New York City. 95 pp. (Apply to Walter Tallmadge Arndt, Secretary, 41 Park Row, New York City.)

PROCEEDINGS OF PUBLIC OWNERSHIP CONFERENCE.
Held in Chicago, November 15-17, 1919. Public Ownership League of America. 1919. 290 pp (Apply to Albert M. Todd, Kalamazoo, Mich.)

STATISTICAL ABSTRACT OF THE UNITED STATES.
Forty-Second Number, 1919. Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C. 1920. 864 pp. Index.

SANITARY PRIVIES.
"Plans and Working Directions for Inexpensive Sanitary Privies, with Notes on the Protection of Surface Wells." Circular issued by the Illinois State Department of Health, Division of Sanitation. 31 pp Illustrated.

THE NINTH ANNUAL REPORT OF THE STATE FIRE MARSHAL OF IOWA FOR THE YEAR 1919.
J. A. Tracy, State Fire Marshal. 43 pp. Published by the state of Iowa. 1920.

Municipal Reports

Akron, Ohio.—Rules and Regulations Governing the Platting of Land Adopted June, 15, 1920, by the City Planning Commission. (Apply to H. S. Firestone, President.)

Fall River, Mass.—Annual Report of the Board of Health for the year ending December 31, 1919. (Apply to Samuel Sandler, M. D., Chairman.)

Fitchburg, Mass.—Annual Report of the Park Commissioners of Fitchburg, Mass., for 1919. (Apply to D. Sidney Woodworth, Chairman.)

Ft. Wayne, Ind.—Thirteenth Annual Report of the Board of Park Commissioners. 1919. (Apply to David N. Foster, President.)

Holland, Mich.—Annual Report of the Board of Public Works of the City of Holland, Mich., for the fiscal year ending March 15, 1920. (Apply to Walter Lane, President.)

London, Eng.—Thirteenth Research Report of the Metropolitan Water Board of the city of London, Eng. (Apply to Sir Alexander C. Houston, Director of Water Examination, Metropolitan Water Board.)

Milwaukee, Wis.—Zoning for Milwaukee. Tentative Report of the Board of Public Land Commissioners to the Milwaukee Common Council, June 21, 1920. (Apply to C. B Whitnall, Chairman.)

New Orleans, La.—Report of the Health and Sanitary Survey, conducted jointly by the Board of Health for the Parish of Orleans and the City of New Orleans and the Metropolitan Life Insurance Company of New York. 1918-1919. (Apply to William H. Robin, M. D., Superintendent of Public Health, City of New Orleans.)

Philadelphia, Pa.—Annual Report of the Bureau of Highways, Department of Public Works, for the year ending December 31, 1919. (Apply to Fred C. Dunlap, Chief of Bureau.)

Trenton, N. J.—Annual Report of the Comptroller of Trenton, N J., for the year ending December 31, 1919; revenues and expenditures. (Apply to Edward W. Lee, Director of Revenue and Finance, and Comptroller.)

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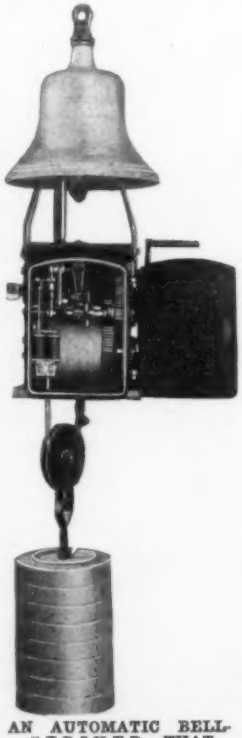
News for Boards of Public Works, Engineers, Contractors, Purchasing Agents, and Others Interested in the Economical Construction and Efficient Operation of Public Improvement Undertakings

A Simple Automatic Bell-Striker for Small-Town Fire Alarms

There are many small towns throughout the country which for years have put up with makeshift signals because of the expense of many of the better type of bell signals. The Gamewell Fire Alarm Telegraph Company, Newton Upper Falls, Mass., manufactures a unit type bell striker which is developed especially for towns of the type mentioned above.



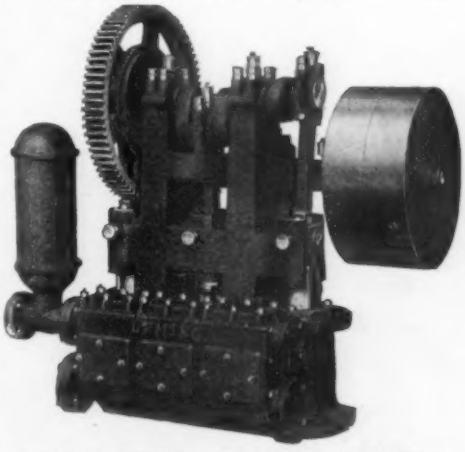
AN AUTOMATIC BELL-STRIKER THAT SERVES SMALL COMMUNITIES

In small towns which have no fire alarm system, the striker is mounted on the top of a building telegraph pole, or anywhere that gives sufficient height for good sound effect. The mechanism by which the alarm is sounded can be located in the fire chief's house, telephone exchange, railroad station, or any central point where fires will be reported. The mechanism or transmitter is mounted on slate with a space for twenty number wheels. When an alarm comes in, the person on hand simply selects the proper number wheel, places it on the wheel holder, pulls the lever, and the entire town is notified. The alarm can be sounded at the maximum speed of one blow a second, which gives prompt action before the fire has developed too far. One, two, three or four rounds of the alarm may be sounded, as desired. The transmitter is mounted on slate with holes in each of the four corners so that it may be readily put up. It requires a space of about 18 by 22 inches and needs no attention except an occasional oiling.

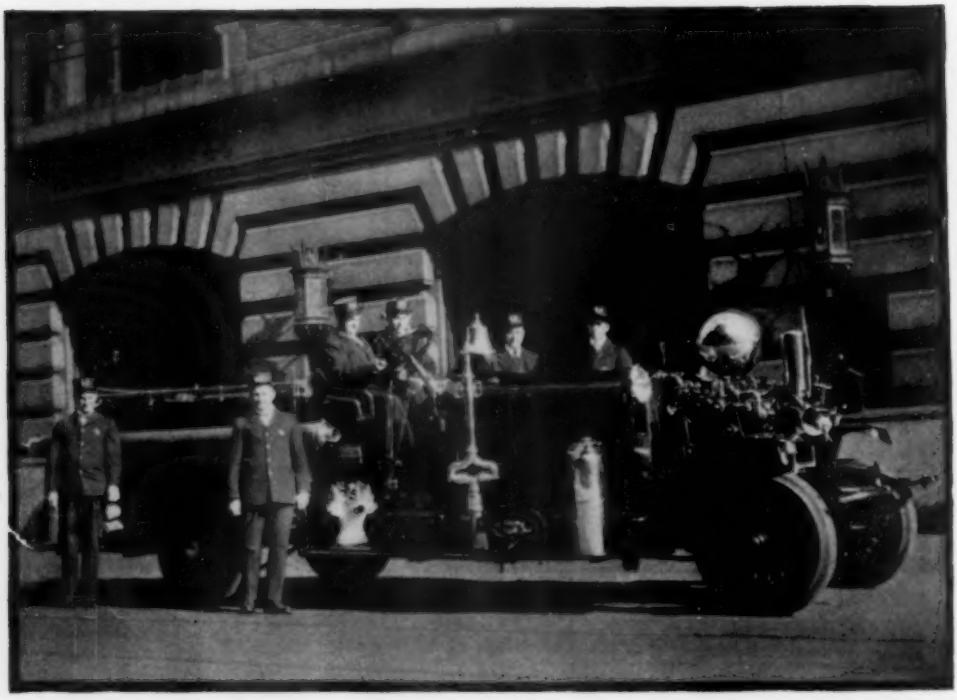
One of the special features of the bell striker illustrated herewith is the ease with which it can be installed. The bell, the operating mechanism and the weights are all in one unit. The striker can be hung and the transmitter mounted in from three to four hours. Probably the easiest method of installing the bell striker is to place it on skids overhanging a flat roof with the weights suspended along the outside of the building, and the housing mounted with the door facing the building so that it will be readily accessible for winding and inspection. The only attention necessary for the striker is that it be wound occasionally. When fully wound, it has a capacity of 3,600 blows, which is ample for a great many alarms. All of the operating mechanism is in the cast iron housing. This housing is provided with a rubber gasket against which the door closes. The handle with the screw clamping latch forces the door tight against the gasket, making the box absolutely water-proof. The outside of the box is painted to effectively protect it against the weather.

Triplex Plunger Pumps for Small Water-Works

The modern pumps for small water-works may be generally divided into two types, reciprocating or centrifugal. The name "reciprocating pump" covers all pumps in which



A SINGLE ACTING TRIPLEX PLUNGER PUMP WITH PULLEY FOR BELT DRIVE



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American-LaFrance Fire Engine Co. Elmira, N. Y.
Robinson Fire Apparatus, St. Louis, Mo.
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the water is displaced by a plunger, piston or bucket, working back and forth in the cylinder. Reciprocating pumps are generally classified (1) with regard to the plane in which the plunger or pistons move (vertical or horizontal); (2) in regard to the number of displacements (single-acting or double-acting); (3) in regard to the number of cylinders; (4) in regard to the manner of packing; (5) in regard to the form or kind of displacers (plungers or pistons).

Probably one of the most common types of reciprocating pumps used in small waterworks is the vertical, single-acting, simplex plunger pump. The Deming Company, Salem, Ohio, has developed this pump in a large number of sizes, which may be belt-driven or motor-driven by means of an intermediate pump gear, and rawhide or fibre motor pinion. The frame consists of two standards and includes cross-head guides and main crank shaft bearings, the latter being lined with anti-friction metal. The gearing is machine-cut and is double in most of the sizes. The pinion shaft is steel, running in boxes lined with anti-friction metal and bolted to the main housing, and the connecting rods in the 4 x 6 size and larger have bronze boxes with wedge and screw adjustment at the cross-head end, with marine type babbited boxes at crank end. Smaller sizes have bronze bushings at the cross-head end. The cross-heads run in bored guides. The plungers are of hard grained cast iron, finished true and smooth, and reciprocate through packing of ample depth. In sizes 10 x 10 and smaller, the cylinders and base are in one casting, while for the larger sizes three separate castings are used bolted to the base. The valve chambers in the larger sizes are separate castings, bolted to the cylinder. These have liberal proportions, affording large valve area, and all valves are readily accessible. Valves for cold water are rubber discs, protected on top from cylindrically wound springs by brass plates. The valve seats are of bronze, screwed into decks, and are of the grid type.

Landscape Architects Dissolve Partnership

In June of this year the partnership of the well-known firm of landscape architects, Arnold & Tripp, Guardian Building, Cleveland, Ohio, was dissolved, Sheffield A. Arnold continuing his business in Boston, and B. Ashburton Tripp taking over the work of the Cleveland office.

Mr. Tripp, who was a graduate of the Harvard School of Landscape Architecture, Cambridge, Mass., was formerly with Olmstead Brothers, Brookline, Mass., and practiced in Detroit, Mich., in 1912. In 1915-16 he was landscape architect and town planner to the Panama Canal and was responsible for the well-known artistic planning and planting of the towns, parks, playgrounds and fortification garrison communities. He specializes in institution group plans, village and town plans and extensions, and park, playground and estate design.

A New Method of Installing Meters

A new device which is being used in many of the houses now building provides for electric meters in a very advantageous way. Under the new arrangement, meters are set in the exterior wall of the house, facing outward; when the meter is to be read by the public service company's employe, he has no occasion to come inside the house or make his presence known in any way; he reads the meter from the outside, and goes his way.

The time-saving, trouble-saving features of this method are instantly apparent, and are not counter-balanced by disadvantages of any sort. The cost is low—$12.50 for each meter so

CONVENIENCE IN METER READING

housed if boxes are built in when the house is erected.

The meter boxes do away with many objectionable conditions; save basement-space the meters would occupy and protect the meters against accident that might have troublesome results. The manufacturers (Donley Brothers, Cleveland) say that these advantages impress householders so strongly that installations are often made in houses already built—the owners being willing to incur extra trouble and some labor-expense in order to do away with the nuisance which accompanies meters placed in the basement.

Chicago Office of Engineers

The Shourds-Stoner Co., Consulting Engineers and Architects, announce the opening of a Chicago office at 825 Harris Trust Building. This is in addition to their office at Terre Haute, Ind., and was found necessary because of the large amount of business secured by this firm throughout the central states.

Some truck owners equip their trucks with Kelly Caterpillars because Caterpillars enable them to operate the trucks without chains.

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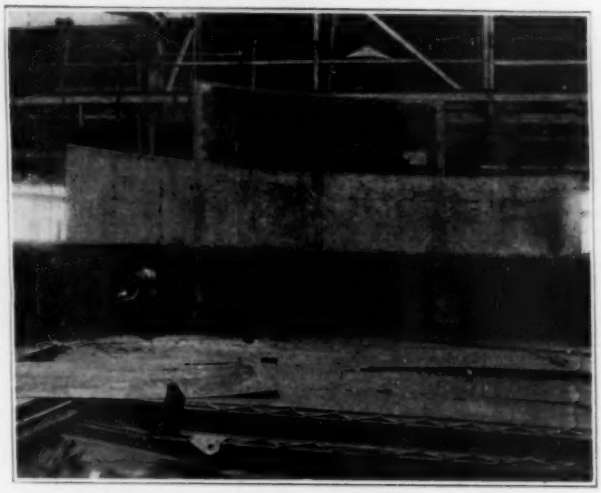

SHOP ERECTION OF STEEL TANK INSURES FIT WHEN ERECTED ON THE JOB

Huge Steel Tank for Great Falls, Mont.

Appreciating the need for increasing the storage capacity for the water-supply of Great Falls, Mont., the city has ordered a 1,000,000-gallon tank from the Chicago Bridge & Iron Works, Chicago, Ill. This tank is now being fabricated and when completed will be 54 feet in diameter and 60 feet high. The tank will be erected on a natural elevation in the city of Great Falls, Mont., and will constitute the main storage supply for the city.

Following the usual custom of the Chicago Bridge & Iron Works on jobs of this character, the bottom and lower rings of the tank are now being assembled in the shop in order that they may be sure that the places will fit evenly and smoothly when put together by the erection crews in the field.

The Need of Well Screens

Whether or not a screen is needed in a well is determined by the stratum from which the supply is drawn and the quantity required. If the water-bearing material is of loose texture like glacial drift, soft sandstone or shale, having fine particles which can be carried, and the current of water leading to the well is strong enough to do it, conditions are produced which will clog the well or make it pump sand. The ability of the current to carry the loose material lies in its velocity and the remedy is found in slowing this down to a point where it no longer carries the material.

This process, called "well developing," consists in bringing the stratum about the well to a stable condition in which it offers free passage to the water which does not carry loose material. To bring this about it is often necessary to pump through a large part of the finer grains in order to surround the well with a body of coarse sand. This is done by pumping the well to a rate beyond its service capacity, by surging the water back and forth and keeping it up until the water pumps clear under service conditions. Wells in sand with a large percentage of fine particles and sands mixed with clay are specially in need of careful attention during development.

The proper place to stop sand entering a pump is to prevent the sand entering the well. There are a number of types of well ends. There are (1) the open pipe, which is the simplest kind of well end. This is adapted to small capacity wells in coarse gravel. The limit of the intake is the cross sectional area of the pipe minus the amount closed by the pebbles; (2) perforated pipe may be used in gravel that is coarse enough to leave free water way and too coarse to pull through the holes; (3) perforated points, covered with woven mesh, are in most common use to keep sand back. Their difficulties come from the nature of the inlet, which presents openings tending to wedge the material. Often the chemical content of the water is such as to set up destructive corrosion between the point and its jacket, completely closing it. These faults make it ill-adapted for use in a good well; (4) the Johnson Brass Well Screen, illustrated herewith and manufactured by E. E. Johnson, 2304 Long Avenue, St. Paul, Minn., is designed to overcome the objectionable features of other screens. The exclusive features of this screen include a continuous slot which increases the inlet area by about 50 per cent more than can be had in screens having interrupted slots. The value of this added area is that it increases the capacity of the screen, or a slower intake flow may be had with the same capacity. The screen is so formed that it will not clog, because of the special under-cut lip construction. If a sand grain can pass the outer edge it is clear to pass all the way through. No other form of solid brass screen permits this. The Johnson screen is designed to withstand the cutting action of the sand. To resist this cutting action, the screen is finished with a sharp under-cut edge of the slot, of very hard brass.

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how extremely easy it is to spoil in the making what otherwise would be a wonderful road. You may have the right specifications, the proper material and the best machinery available, but carelessness or poor judgment in the mixing or combining the material, in the spreading or in the compressing or rolling may lay the foundation for unlimited trouble.

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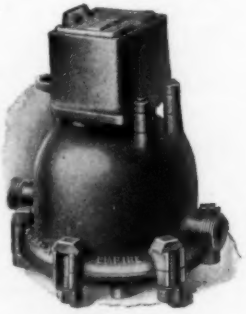
A Convincing Endurance Test

In making recording instruments that are to be subjected to rough usage, the manufacturer has a double task before him. Accuracy is the first and indispensable desideratum, but it must be accompanied by a sturdiness of construction that will defy time, neglect, rough handling and over-work. This is especially true of water meters, that are frequently in charge of inexpert workers, that are set in all sorts of exposed places and that are subject, throughout the years, to endless changes of temperature and the action of all sorts of water. Accuracy, however, is taken for granted, and the buyer of meters concerns himself principally, as is quite proper, with the durability prospects of the instrument under consideration.

With this requirement in view, a member of the National Meter Company, 299 Broadway, New York City, with a taste for statistics, made an interesting computation some time ago, of the work of one of that company's well known Empire meters, in the ⅝-inch size, that had just made an especially remarkable showing. In the first place it was attached to a ¾-inch pipe and was passing more than twice the proper rating per day, or about 6,000 cubic feet; consequently, although only in service two years and two months, the amount of



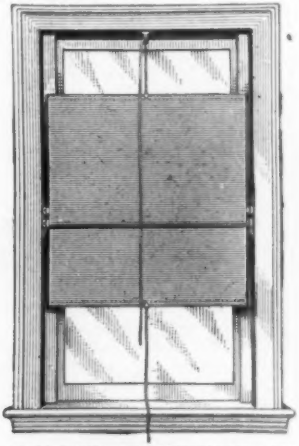
water registered was over 4,138,000 cubic feet or 31,142,560 gallons.

It was obvious that the piston of this meter had been called upon to do a most unusual amount of traveling in a short time, and the subsequent calculation, made by the statistical observer, showed the distance covered by it, in delivering this amount of water, to have been the equivalent of over 200,000 miles, or eight times around the earth. It would not have been unreasonable to expect that this would have been the end of the career of this palpably over-worked instrument, but on the contrary, with the supply of a new intermediate, and a few minor adjustments, all at a total cost of a little over three dollars, it was restored to its original condition and pronounced by its delighted owner to be "as good as new."

The oscillating piston, which is the characteristic feature of the Empire meter, is the explanation of its wonderful endurance. The piston is so balanced as to water pressure that the flow exerts no strain on it, but simply causes it to move forward in its proper motion, practically floating on the water. The contact of the piston with the walls of the measuring chamber is so gentle that it serves to polish rather than wear them, thus putting the mechanism in the best possible condition for long periods of service.

Correct Light and Proper Ventilation for Public Buildings

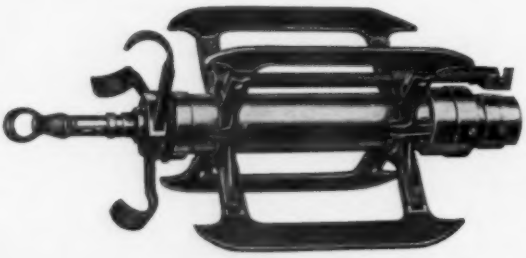
Unusual care should be exercised in the selection of window shades for such public buildings as schools and hospitals, where the color of the window shades and the method of hanging have much to do with the comfort of the school child or the convalescent patient. It is a recognized fact that certain colors of window shades in schoolrooms cause eyestrain and headaches. Chemists have made a study of this for the Stewart Hartshorn Company, 250 Fifth Avenue, New York City, and have devised two colors in tinted cambric shade cloth which are being used extensively by boards of education in schools throughout the country. In hospitals and sanitariums where it is necessary



THE BEST ARRANGEMENT OF SHADES FOR SCHOOL ROOMS

to darken rooms for the comfort of the patient, dark green or brown should be used.

Control of ventilation can be secured by placing two shades at the center of the windows, as shown in the accompanying illustration. When the window is opened from the top the glare is shut out by the lower shade, and if the window is open at the bottom the upper shade is raised. Two short shades at the center of a window hang straight and smooth, roll evenly and wear much longer than one shade covering the whole window. The increased length of life of the two short shades is worth considering for buildings where they are subjected to very hard usage, such as schools and auditoriums.



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Testing Water Meters for Accuracy

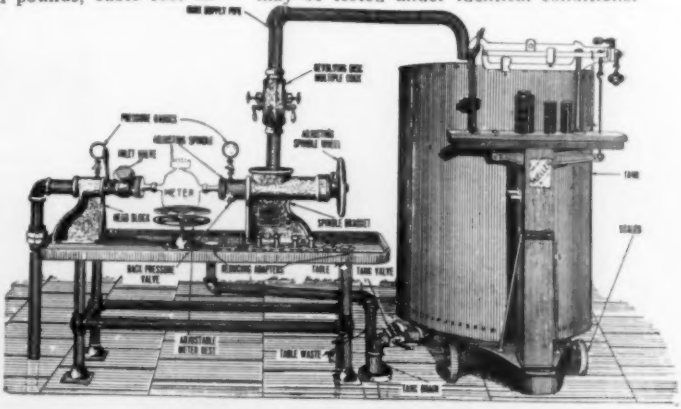
After water meters have been in service for several years, most municipalities and water companies make a practice of testing them for accuracy. This is a protection to the consumer, as well as to the municipality or company, and should be welcomed by the consumer as expressing the desire of the producing agent to serve the consumer properly and accurately at all times.

A meter-testing machine adapted to testing all types of service meters is made by the H. Mueller Manufacturing Co., Decatur, Ill. The tester is made in two sizes, one which will handle meters from ½ to 1 inch in size and the other machine from ½ to 2 inches. A complete set of adapters for fitting all meters to the tester in furnished with each machine. Some meters will properly register a stream of water the full size of the meter, but are defective for smaller streams. As a rule, when a meter is not accurate for a stream of water the full size of the meter, the defect is liable to be greater on smaller streams. For these reasons, the test should be started with a stream of water the same size as the meter and repeated on smaller sizes until the accuracy or inaccuracy of the meter for any size stream is fully determined. Multiple cocks, with different size orifices are furnished with these machines to enable the operator to secure different size streams. Special pressure gauges, able to withstand the shock caused by the sudden closing of the valve, are furnished as a part of the meter testing equipment, and purchasers are advised not to equip testers with their own pressure gauges, which are not adequately protected to withstand the water hammer to which they are subjected.

The scales are especially constructed; in addition to two bars graduated in pounds, cubic feet and gallons, the Mueller water meter beam has a special bar which is graduated in per cent. The purpose of this bar is to determine the per cent of error in a meter. The two bars graduated in pounds, cubic feet and gallons may be used for making small tests or for balancing the scales between the tests without emptying the tank. These bars also enable the error in the meter to be determined in pounds if for any reason it is so desired. The machine has two counterpoises, the front counterpoise used in the customary manner, simply as a balance and for holding the weights that weigh the water used in testing. The per cent counterpoise is used on the per cent bar for determinin the per cent of error in meters. The per cent counterpoise is marked 1 cubic foot, 7½ gallons, 62½ pounds, and is used alone for determining the error when 1 cubic foot or 7½ gallons of water is used in a test. The front of the per cent counterpoise rod is marked 2, 3, 4, 5, 10, 15, 20, 25, 30 and 40 cubic feet. The left side of the rod is marked in gallons and shows the number of gallons equal to the cubic feet graduations on front of the rod. The right side of the rod is marked in pounds and shows weight of water to correspond with cubic foot graduations. When testing with either of these, numbers of cubic feet or gallons of water by weight are built up on the per cent counterpoise to the number desired for determining the error. The per cent counterpoise is of itself equal to 1 cubic foot, 7½ gallons or 62½ pounds, and must be so considered when building up combinations of weight. For making a 10-cubic-foot test, the per cent counterpoise is counted as 1 cubic foot, and on it should be placed two 2-cubic foot weights and one 5-cubic foot weight. This will correspond to 10 cubic feet on the per cent counterpoise.

Two sets of weights are furnished with each scale, the larger set is marked in cubic feet, gallons and pounds and is used on the front counterpoise to weigh the water used in the test. The smaller weights are marked in cubic feet, gallons and pounds and are used on the per cent counterpoise to determine the error of a meter when tested with more than 1 cubic foot, 7½ gallons or 62½ pounds of water. For testing small meters, it is suggested that sufficient water should be run through the meter to cause one or more complete revolutions of the indicator on the meter dial.

One of the best ways of comparing the accuracy of different water meters under like operating conditions is by the use of a meter testing machine. In this a group of meters may be tested under identical conditions.



APPARATUS FOR TESTING WATER METERS

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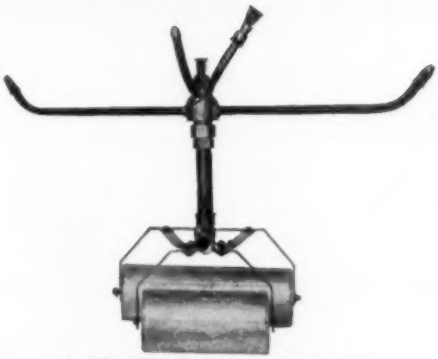

A PRACTICAL LAWN SPRINKLER

A Lawn Sprinkler With Many Advantages

There is something very interesting to the casual looker-on in watching park sprinklers send out their misty sprays over park lawns and golf courses. Many times it is not so interesting to the laborer who must shut off the water and wade over the newly seeded ground which is being sprinkled, in order to move the spraying device to another place. The Buckner No. 3 Sprinkler, illustrated herewith, has particular qualities which overcome the objectionable features from the laborer's standpoint. This sprinkler is mounted on an iron carriage with an all-steel frame and has rollers made of No. 24 galvanized iron, 5 inches in diameter and 15 inches long, with an axle that runs all the way through. They are made for either a 1-inch or a ¾-inch hose connection and are very widely used by golf clubs and park departments in the West, particularly in California, where the long dry season makes it imperative that lawns and parks be watered frequently to maintain the beauty of the grass.

This sprinkler can be pulled from place to place by the hose without causing any strain on the hose and without turning off the water. This saves much labor and also makes it possible to water a newly seeded putting green or lawn without having to walk over the soft, wet ground in order to move the sprinkler from place to place. These and other features are embodied in the well-known sprinkler systems manufactured by W. A. Buckner, 1051 T Street, Fresno, Cal.

City Planning Service

George B. Ford has been appointed Director of the City Planning Department of the Technical Advisory Corporation, 132 Nassau Street, New York. Mr. Ford, who was chairman of the City Planning Committee of the American Institute of Architects and is a director of the American City Planning Institute, has recently been retained as adviser on foreign housing to the U. S. Senate Committee on Reconstruction and Production. Besides his widely known city planning and zoning activities in this country, Mr. Ford has recently completed a long engagement in France, where he was city planning consultant to many of the cities of the devastated areas, including Rheims, Arras and Soissons.

A Comfortable Park Bench That Will Last

The new "Bausman Special" park bench, which has been developed by the Bausman Manufacturing Company, Lancaster County, Bausman, Pa., weighs only 45 pounds. This bench is well based, and comfortable and is the result of months of constant experiment to produce a satisfactory and attractive park bench. Park superintendents and others who have had experience with the rough treatment that park benches receive will be interested to examine this bench, which is built on the best principles developed in the theory of tructures. All bracing makes triangles the strongest element in civil engineering construction. The frame which is made of 1½ x ¼-inch round-edge steel is so strong that with the settee on end, 500 pounds could be placed on the end without any damage. This is not exactly the treatment to which settees are ordinarily subjected, but represents many times the stress developed by people moving along the park bench, and subjecting it to lateral strain. The seven slats which form the seat and back have rounded bases and are made of selected hardwood.

A PARK BENCH THAT IS STEADINESS PERSONIFIED

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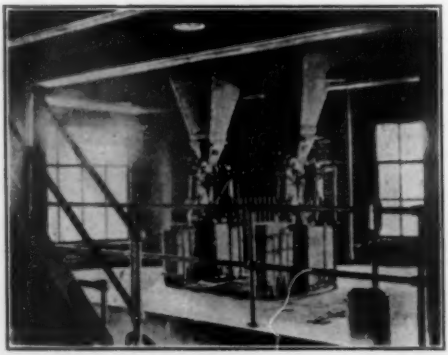

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A LUDLOW VALVE WITH DEAN ELECTRIC CONTROL

The Electrical Operation of Heavy Water-Works Valves

The ready control and operation of large water-works valves is a matter which has troubled water-works officials for many years. The motor operation of pump discharge valves and large distribution valves for water-works would result in tremendous saving in labor each year, as well as in reducing losses due to breaks in water-mains where there are no available means for readily stopping the flow.

There are three types or kinds of power-operated devices for gate valves, namely, hydraulic, water and electric motor. Piston or hydraulic cylinder valves may be used with steam, air or water, the last medium being considered best for general purposes. The cylinders are of cast iron, brass-lined, carrying the ordinary hydraulic plunger, and pressure is admitted either above or below the piston by a four-way cock or valve. In case of failure of water pressure, provision is sometimes made to attach a stem and yoke so that the ordinary hand-wheel operation can be secured. This type, although extremely simple in construction and operation, is not suitable where the temperature is liable to fall below freezing and put the piston out of commission. In addition, this device cannot be attached to existing hand-operated valves. The water-motor has been used to some degree, but it is necessary to have a reversing switch, as the ordinary water-wheel operates only in one direction. This valve is also liable to freeze when not in use in cold weather.

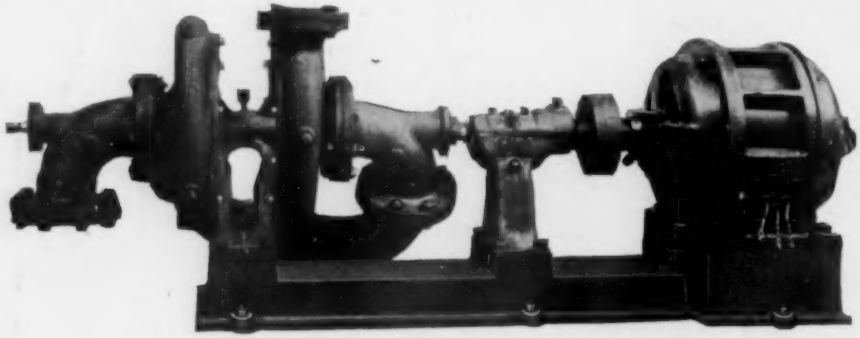
Electrical operation of valves by a motor geared to the valve stem and a limit switch for stopping the movement is by far the most reliable method. There are still some problems to be considered even in this ideal system. The movement of the gate valve must be confined within very precise limits, especially at the closed position. On account of the momentum or over-travel of the motor armature and driving gears after it has been disconnected from the circuit, it is easily seen that these limits are not easily obtained unless some quick-stopping device, such as a solenoid brake, is applied to the motor shaft. Peter Paine Dean, Cutler Hammer Manufacturing Company, 50 Church Street, New York, has developed the Dean system of valve control, which incorporates five distinct features: (1) it is a single-unit system; (2) it can be attached to existing valves with a minimum of effort and without shutting down the line; (3) it is positive in operation and does not depend upon momentum or drift of moving parts to seat; (4) it has ample unseating and seating torque; (5) the whole unit is enclosed and water-proof.

The system consists of a single unit in which are incorporated a driving motor, reduction gears and limit trip mechanism. The feet of the unit are provided with four holding-down bolt holes of standard dimensions for a given range of valves. The motor is totally enclosed and water-proof and possesses an extremely high torque. It is connected to a system of combination worm and planetary gearing for the necessary reduction in speed. The motor speed is normally 1600 R.P.M. and the slow speed shaft 40 R.P.M., the gear reduction being 40 to 1. With different gear ratio incorporated in the same casing a reduction of 120 to 1 or 14 R. P. M. on the slow speed shaft is available. Repeated tests of this system of valve control show its complete success under all operating conditions.

Uses of Universal Pipe

Universal pipe, the special form of cast iron pipe manufactured by the Central Foundry Company, 90 West Street, New York City, is particularly valuable for emergency installations for water supply or fire lines, because of the rapidity with which it can be laid. No lead, no pouring and no packing are required and wrenches are the only tools necessary for laying it. For permanent installations it has met with success in water service and also for high pressure fire lines.

AN EMERGENCY INSTALLATION OF UNIVERSAL PIPE



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